PAINT and VARNISH Production.

HE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES

PRIL,
1958

NEW FROM RCI—WALLKYD 1957-40

A THIXOTROPIC ALKYD

Formulate Flats and Gloss Enamels with These Big Advantages!

NO STIRRING . . . . . applied in thick, jelly-like form, coatings made with WALLKYD 1957-40 become liquid under the friction of brush or roller.

NO SETTLING . . . . . Pigmentation of flats or enamels made with WALLKYD 1957-40 remains suspended evenly throughout the mixture, from production to application.

NO DRIPPING . . . . . Consistency of coatings made with WALLKYD 1957-40 practically eliminates running and dripping, assures faster applications.

NO SAGGING . . . . . Usual tendency of surface films to sag is effectively controlled in products formulated with WALLKYD 1957-40.

Are you offering a line of these easy-to-use thixotropic paints? They can become a new profit-maker for your company. Your RCI representative will gladly give you full details on the advantages in formulating thixotropic flats and enamels with WALLKYD 1957-40. Call him soon.

Creative Chemistry...
Your Partner in Progress

RCI

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Hydrochloric Acid • Formaldehyde • Glycerine • Phthalic Anhydrid
Maleic Anhydride • Sebacic Acid • Ortho-Phenylphenol
Pentaerythritol • Pentachlorophenol • Sodium Pentachlorophenat
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REICHHOLD CHEMICALS, INC.,
RCI BUILDING, WHITE PLAINS, N.Y

EAK . . . a high-boiling solvent with a future

In formulations for surface coatings, ethyl amyl ketone complements low-boiling MEK and medium-boiling MIBK by promoting better flow and gloss and eliminating dry overspray.

EAK possesses excellent blush resistance, good diluent tolerance and high solvency for surface coating materials. Its slow evaporation rate contributes to excellent flow-out, tends to minimize pinholing and bubbling in the film.

EAK has proved to be a valuable component of thinners for various types of coatings such as automotive refinishing lacquers, silk-screen printing lacquers and multicolor lacquers. Cellulose esters, vinyl polymers and copolymers, and almost all synthetic and natural resins are soluble in EAK.

Your Shell Chemical representative will be glad to discuss your specific solvent needs with you. Write for Organic Chemicals, a catalog of Shell solvents, resins and intermediates.

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REPEAT SALES OF
YOUR EXTERIOR WHITES
WITH

UNITANE®

O-220

TITANIUM DIOXIDE

Lasting whiteness, clean weathering and resistance to yellowing are vital selling properties in exterior white paints . . . and they're imparted to an outstanding degree by UNITANE O-220. This anatase titanium dioxide is particularly recommended for exterior white house paints, both in conventional and fumeproof formulations.

Whatever your requirements, there's a UNITANE pigment—either anatase or rutile—in a grade exactly right for your formulation. Ask your Cyanamid Pigments representative for details.

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PAINT and VARNISH

NEXT ISSUE

Commencing with the May issue, a two part series on the use of epoxy-based masonry materials for construction, repair, and maintenance will be presented. This series will cover epoxy coatings for masonry surfaces, and 100% solids systems for troweling, spraying, knifing, and roller coating.

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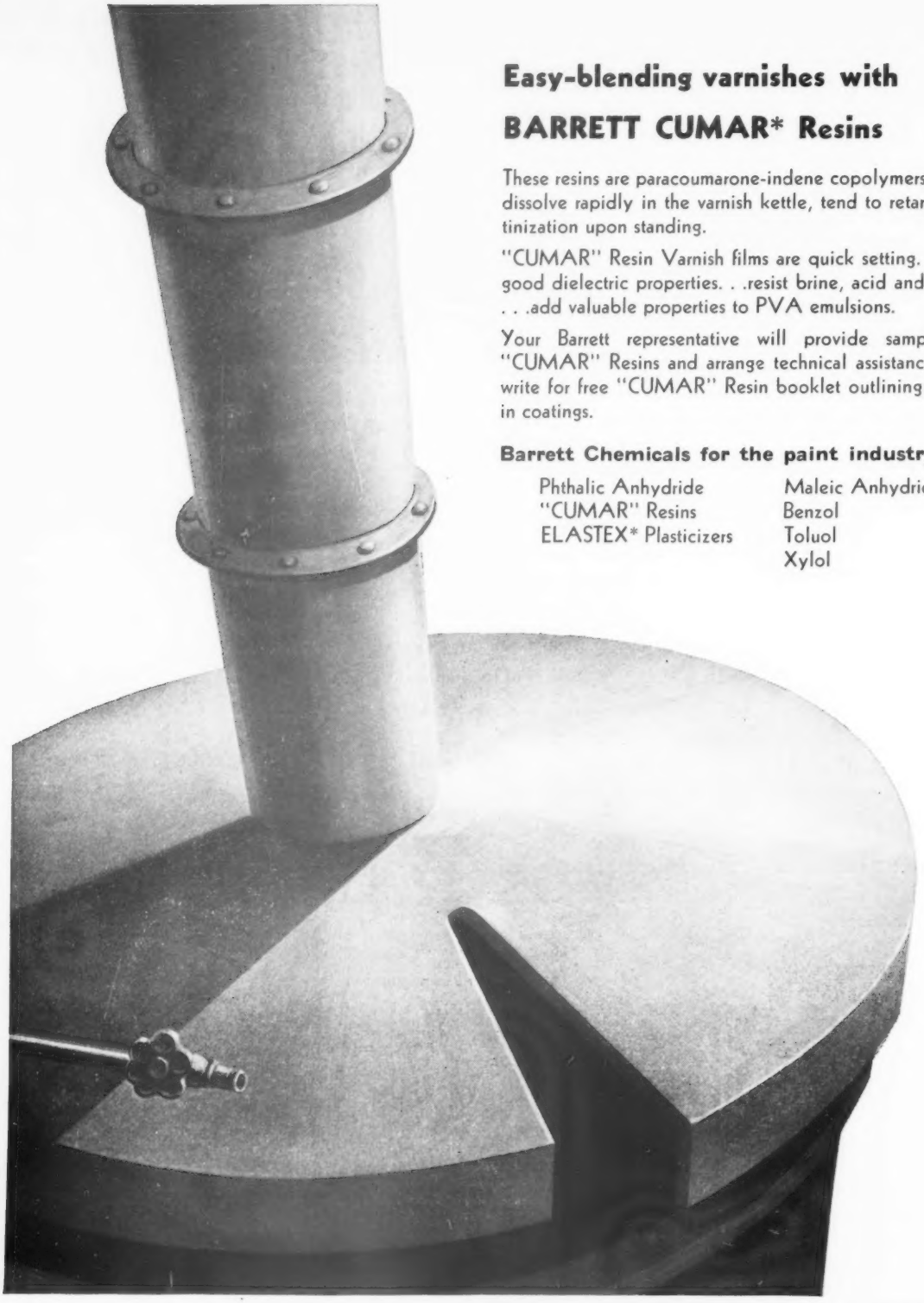

Easy-blending varnishes with BARRETT CUMAR* Resins

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"CUMAR" Resin Varnish films are quick setting. . .have good dielectric properties. . .resist brine, acid and alkalis . . .add valuable properties to PVA emulsions.

Your Barrett representative will provide samples of "CUMAR" Resins and arrange technical assistance. Or write for free "CUMAR" Resin booklet outlining its use in coatings.

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- "CUMAR" Resins
- ELASTEX* Plasticizers
- Maleic Anhydride
- Benzol
- Toluol
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OVER 100 YEARS OF EXPERIENCE

*Reg. U. S. Pat. Off.

A New Concept

DURING the past year, the paint industry has shown renewed interest in microbicidal paints as evidenced by the marketing of numerous products which are claimed to have germ or bacteria-killing properties in one form or another. Vigorous research in this field has resulted in improvements which make the use of these paints practical. Such paints undoubtedly have terrific sales appeal, as everyone is vitally concerned with human health. To a family that experiences illness, paints with germicidal properties are of definite interest. Moreover, these paints have a great potential in such applications as hospitals, clinics, hotels, restaurants, public buildings, etc.

Other interesting uses for microbicidal paints have also been announced. For example, one antiseptic paint marketed a few months ago is being recommended for application to objects which are handled by the public such as telephone handsets, toilet seats, flush levers, door knobs, etc. Another type is designed for children's toys, furniture, inhaler nose pieces, combs and tooth brushes. The anti-pathogenic properties of these paints are derived from anti-microbal compounds incorporated into the paint formulation.

This is a new concept in architectural and industrial coatings and, with proper merchandizing, could develop into a huge success.

A Good Move

WE noted with interest the recent announcement by the Federation of Paint and Varnish Production Clubs that the site of the 23rd Paint Industries' Show and the Annual Meeting scheduled next fall will be the Cleveland Public Auditorium.

Since this show has grown phenomenally over recent years, former arrangements in a hotel were no longer adequate. Certainly, the Cleveland Public Auditorium will provide more than enough space which will please both exhibitors as well as conventioneers.

The Federation is to be congratulated on their foresight in securing such facilities for the for the forthcoming Paint Show and Annual Meeting. This move will be a welcomed change.

Appraising Paints?

WHAT guides are used to appraise paints? This subject was given careful attention by C. F. Pickett, director of the Coating and Chemical Laboratory, Aberdeen Proving Ground, Maryland in an article "Why Paint Specifications—Their Tests and Controls" in a recent issue of the *ASTM Bulletin*.

According to Mr. Pickett, paint specifications frequently fall into the class of composition or performance. He believes that neither one alone is sufficient to completely describe a paint product for the following reasons:-

"If composition alone is used, there is bound to be misunderstanding. There is much art and science in compounding, blending, and processing a finished paint product. A paint formula is of limited value in inexperienced hands. In composition specifications the matter of analysis is a problem.

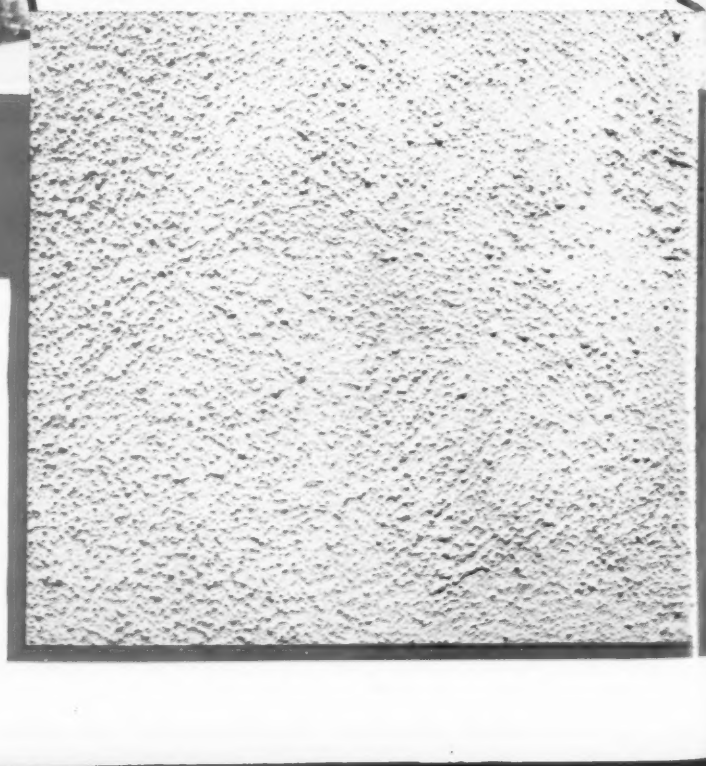
"However, in the final analysis the real test is the performance of paint under actual service requirements. The paint industry is aware of the need for better methods of physical testing that can be correlated with actual service requirements."

For example, Mr. Pickett points out that atmospheric exposures which may run for years are dependent on care of panel preparation. Other factors which may further complicate the performance testing are the season the atmospheric exposure test is started plus the unpredictability of the elements.

What is needed is a combination of composition and performance specifications, according to Mr. Pickett. Thus, Mr. Pickett continues, if both composition and physical tests are required to a degree, it is possible to obtain a given type of product properly formulated, compounded, and processed, which would work to the advantage of both the buyer and seller.

Three Years of E

Note Excellent Appearance of Stucco Surface After 3 Years' Exposure!



NO STREAKING, BLEACHING, OR PEELING:

The stucco exterior of this west coast home was painted with a BAKELITE Brand WC-130 based paint over three years ago. Despite heavy rains and semi-tropical heat, no streaking, bleaching, or other sign of failure is evident. *Look at the close-up* of a small section of the stucco surface. The paint is obviously in "just-applied" condition.

Exposure Testing Prove . . .

Excellent Performance of Exterior Paints made with Bakelite WC-130 Vinyl Latex

The proof is in the performance . . . and the performance is excellent! It's proof resulting from more than five years of thorough research. Laboratory analysis, test panel results under climatic extremes, and on-the-job home decoration . . . these are your assurance of the distinct advantages of high-quality *exterior* paints based on BAKELITE WC-130 Vinyl Latex.

This is important news for formulators! Paints based on WC-130 are easier to apply, and therefore easier for you to sell. You and your customers get the profitable benefits of excellent ultra-violet light stability, alkali and water resistance, good pigment-binding ability and package stability. Plus: uniformity of appearance, full depth of color, and flexibility of formulation to cope with conditions of high humidity, heat, cold, or weathering.

Use BAKELITE WC-130 yourself. You will be pleased to find how economically exterior paints can be formulated with WC-130 as the base. This latex, polymerized under proper conditions of temperature and pH, gives a smooth and stable emulsion which assures a uniform film with a noticeable absence of foaming. BAKELITE Brand WC-130 is a proven latex that assures the development of finished formulations for quality emulsion paints. Talk with your Bakelite Company representative. He'll give you the complete quality story and supply you with samples for testing. Or use the coupon below. Remember – uniformity assures customer satisfaction time and time again.

EXTENSIVE FIELD TESTING IN EXTREME COLD AND SEMI-TROPIC CLIMATES

These test panels which have been exposed to wind, rain, cold and sun have demonstrated the ability of paints based on BAKELITE Brand WC-130 Vinyl Latex to look better and last longer.

pays to formulate with

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BRAND
WC-130 VINYL LATEX

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☐ I would like samples for testing.

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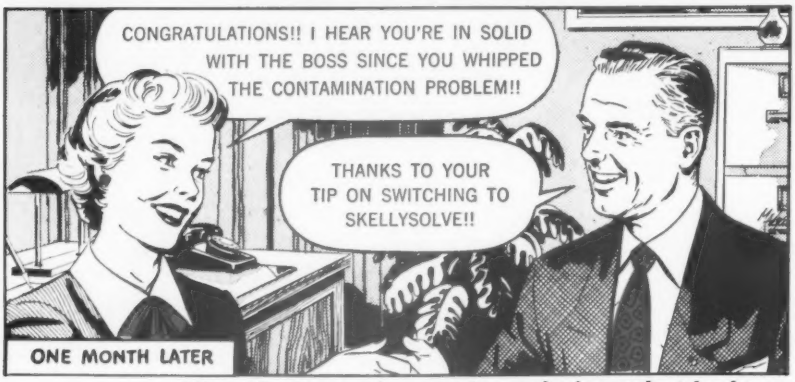
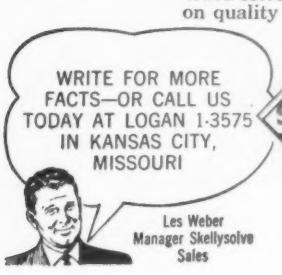


When solvents are so important to your business, why take chances on quality or delivery? Next time you order specify Skellysolve.



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SKELLY OIL COMPANY

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Skellysolve for Paint, Varnish and Lacquer Manufacture

SKELLYSOLVE-L. A quick-evaporating lacquer diluent of exceptionally sweet odor. Closed cup flash point about 12°F.

SKELLYSOLVE-S. Low end point mineral spirits for thinning paints, varnishes, and polishes. Closed cup flash point about 103°F.

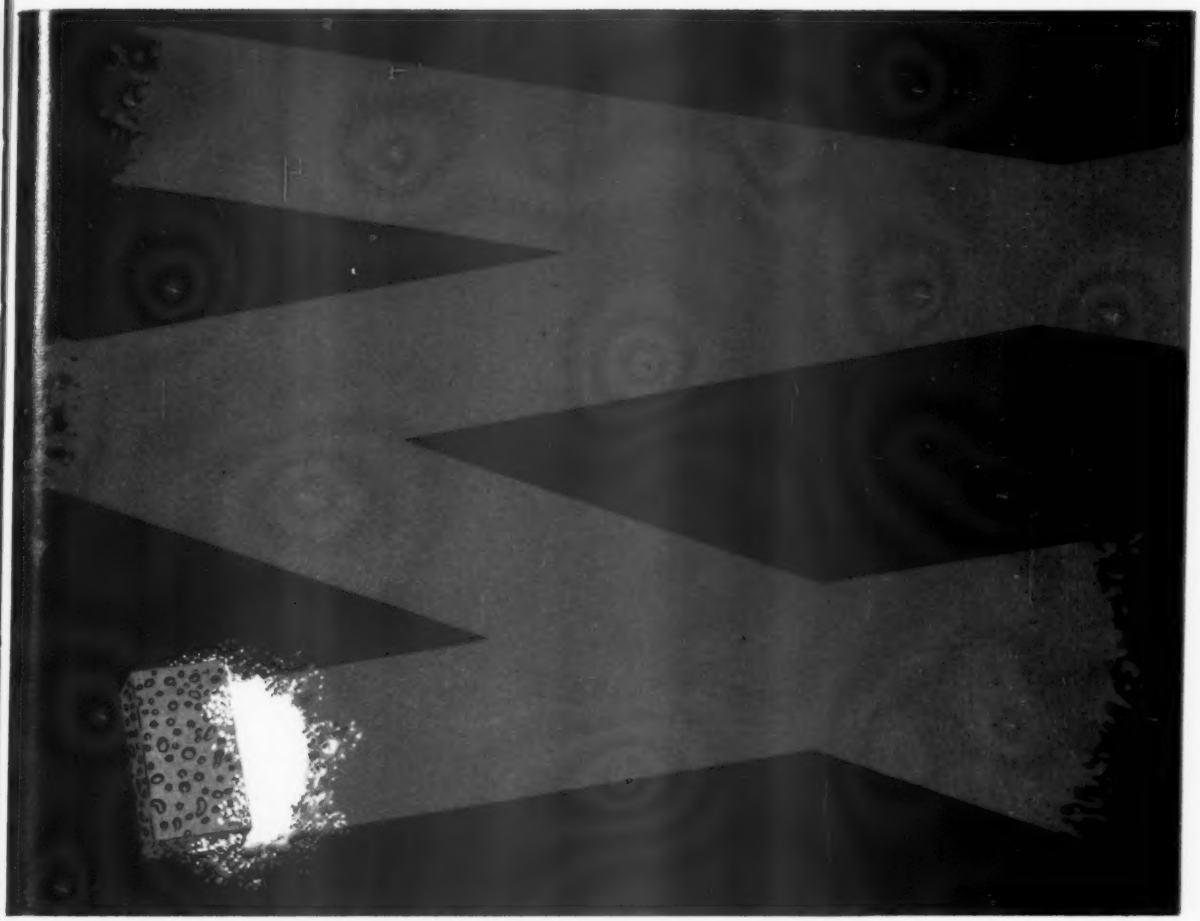
SKELLYSOLVE-S2. A quick-evaporating mineral spirits. Closed cup flash point about 101°F. Excellent for industrial paints and for polishes and waxes.

SKELLYSOLVE-V. Narrow boiling range VM&P naphtha. Excellent for dip and spray enamels. Closed cup flash point about 50°F.

SKELLYSOLVE-T. High boiling mineral spirits for longer wet edge. Closed cup flash point about 140°F.

SKELLYSOLVE-X. A heavy, slow drying naphtha having a high flash point. Used to increase the wet edge time, to give better flow and leveling characteristics tending to eliminate brush and lap marks in hot weather.

Ask about our new Skelly Petroleum Insoluble Grease and wide range of aromatics.



here's why Gelva PVAc emulsions offer more for your money

you can sell the superior scrubability of Gelva based paints

The free filming characteristic of GELVA TS-30 emulsion and its optimum particle size distribution contribute significantly to the outstanding scrubability of GELVA based paints. This is an important advantage which you can sell to your customers. GELVA TS-30 also has superior stability and an unexcelled balance of properties for a full line of coatings, interior and exterior paints and primer sealers.

What's more, Shawinigan provides GELVA users with technical service in depth . . . technical service based on more than 10 years experience with commercially proved polyvinyl acetate paints. Shawinigan is ready to give you all the assistance you need to formulate and manufacture exactly the right polyvinyl acetate paint, homopolymer or copolymer, for your market. It will pay you to consult Shawinigan . . . we have the quality and the know-how. Write for our booklet, "GELVA Emulsions for Paint", to Shawinigan Resins Corporation, Department 2204, Springfield 1, Mass.

Success with PVAc paints requires a quality emulsion and expert technical service. You get both from Shawinigan.

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3. Less warehousing and inventory space.
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Quality-controlled at every step of production, *Pittsburgh* Phthalic Anhydride maintains good molten color stability over long periods, and requires no special alloy steels for handling. It is essentially free of maleic anhydride and benzoic acid, thus assuring uniform reaction rates and reducing product variations.

Let us know about *your* P.A. problems today. *A call or wire will place an experienced Pittsburgh Industrial Chemicals man at your service!*

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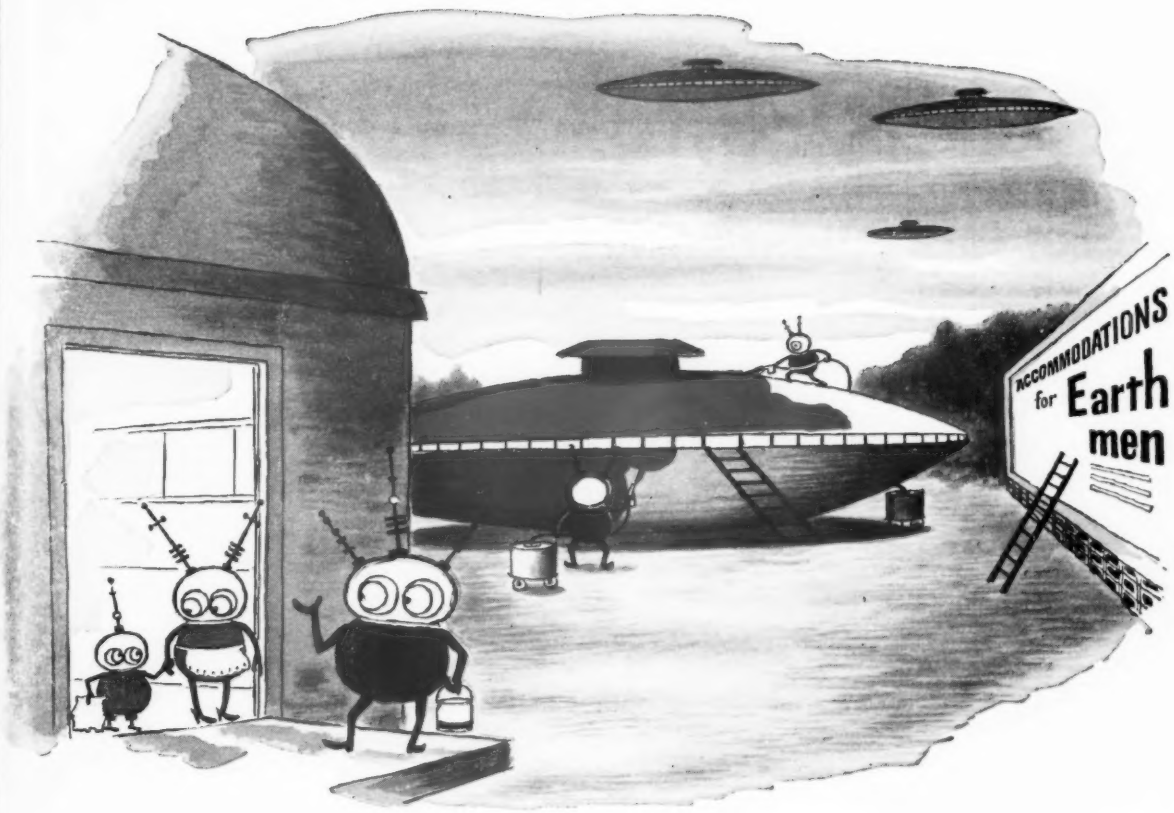


"Daddy says n-Propyl Acetate not only saved us 10¢ a gallon, but it made a brighter lacquer for our sightseeing buses..."

Can you use a savings of up to 10¢ a gallon in your nitrocellulose lacquer formulations?

If you are now using a combination of ethyl and butyl acetate, by using n-Propyl Acetate as a replacement, you can save as much as a dime a gallon. You can pick up other important savings, too, by using n-Propyl Acetate in place of methyl isobutyl ketone, isobutyl acetate, and mixtures of isopropyl acetate and n-butyl acetate.

And in hot spray lacquer formulae, Celanese n-Propyl Acetate permits maximum viscosity reduction combined with good flow and blush resistance... and at low cost.

Your Celanese Representative can give you complete details about this cost-saving medium boiling solvent.

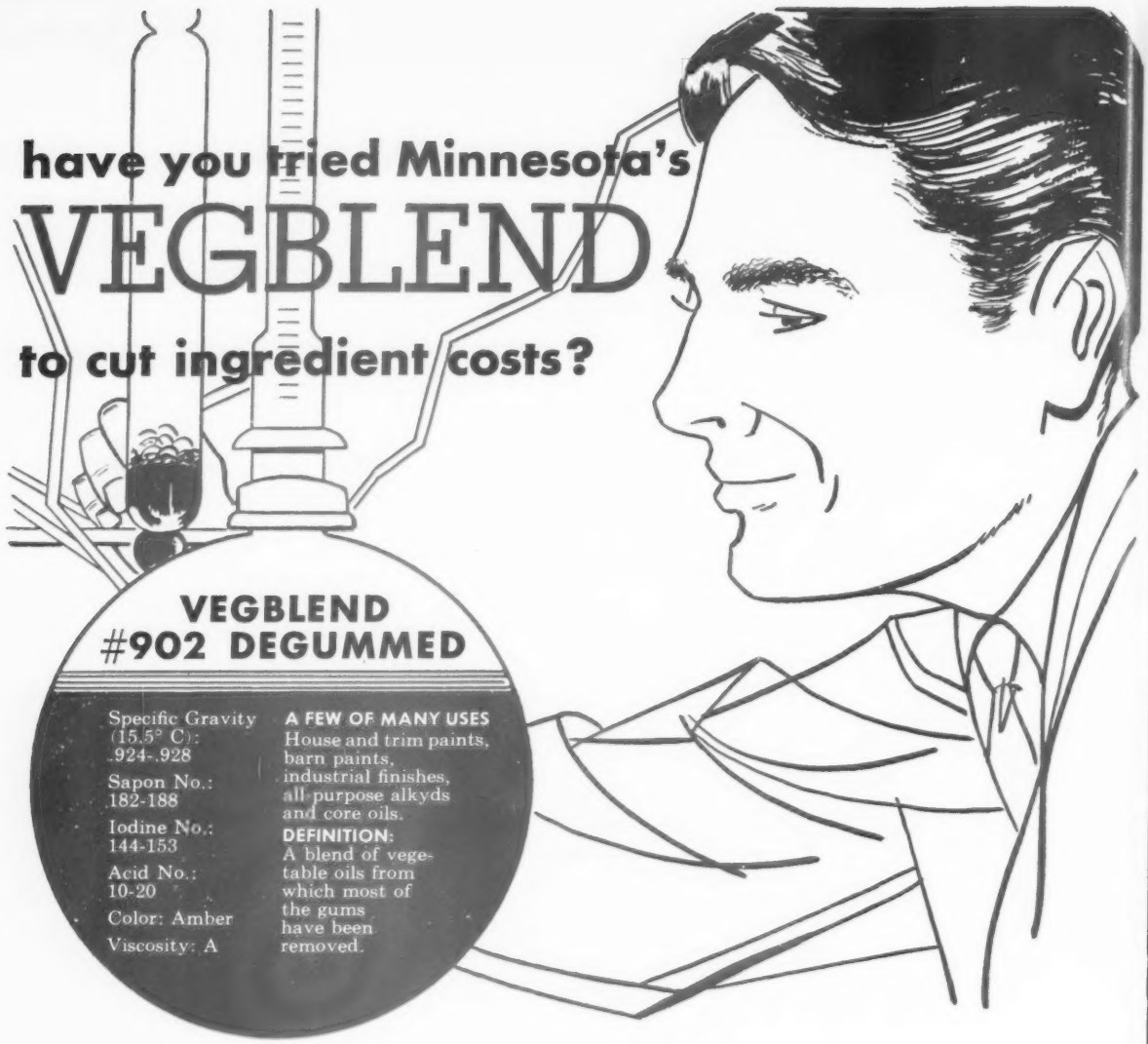
Celanese®

n-propyl Acetate... a Celanese CHEMICALS solvent

Celanese Corporation of America, Chemical Division, Dept. 558-D, 180 Madison Avenue, New York 16.

Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16.

See Chemical Materials Catalog and Chemical Week Buyers' Guide for complete listing of Celanese Chemical Products



Does your paint or vehicle formulation call for an economy-grade drying oil? Don't sacrifice consistency or control . . . use Vegblend. This vegetable derivative made by Minnesota Linseed is a blend of glyceride oils from which most of the gums have been removed. It is the lowest cost natural vegetable oil available.

Vegblend can be used in all colors right down to the light shades with the same dependability of characteristics that have made Minnesota Linseed the trusted name in paint materials. Specifications for degummed Vegblend are noted here.

We will be pleased to send you samples of this and other members of the Vegblend family. Remember, we have a representative near you . . . phone us today for complete information and fast service.

Vegblend is also available Acid Refined . . . Blown . . . Aged . . . Universal . . . Alkali Refined.

Minnesota

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Minneapolis 21, Minnesota Phone: SUnset 8-9011

SPECIFY MINNESOTA
IT'S PURE
LINSEED OIL

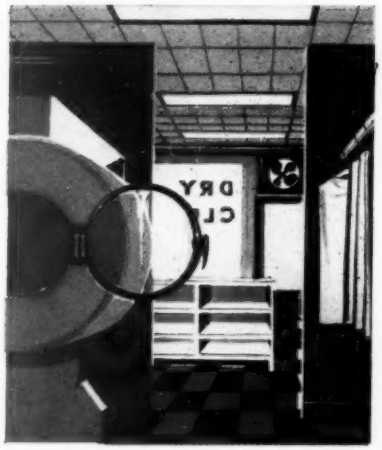
PROBLEMS AND SOLUTIONS IN LACQUER TECHNOLOGY...

one of a series of ads designed to acquaint formulators with the properties and applications of the various types of cellulose acetate butyrate.

Which type of cellulose acetate butyrate would you select for this coating problem?

PROBLEM:

To formulate a lacquer resistant to dry-cleaning fluids



ANALYSIS: Because of the many chemical agents present in a dry-cleaning plant, this lacquer, first, must be capable of withstanding the attack of dry-cleaning solvents such as perchloroethylene and aliphatic hydrocarbons. Second, it must exhibit good moisture resistance. Third, it must have a satisfactory degree of hardness, flexibility, toughness and stability to ultraviolet light. And, last, for ease of formulation, the type of cellulose acetate butyrate selected must be compatible with a wide variety of plasticizers and other modifying agents.

SOLUTION: Of the four types of Eastman cellulose acetate butyrate used as film formers, those of lower butyryl content, EAB 171 (17%) and EAB 272 (27%), generally have better chemical resistance than do those of higher butyryl content, EAB 381 (38%) and EAB 500 (50%). Although EAB 171 has the maximum resistance to solvents, EAB 272 is resistant to solvents usually encountered in the dry-cleaning industry. This consideration focuses our choice between these two types, because, while EAB 381 and EAB 500 have greater moisture resistance than do EAB 171 and EAB 272, their advantage in this respect is not sufficient to be of importance here.

By selecting EAB 272, greater compatibility is obtained with a larger number of plasticizers and resins. This permits the lacquer formulator to select the modifying agents that will further improve the moisture resistance and other properties of films based on EAB 272, without compromising their chemical resistance.

In addition, EAB 272 is more soluble in common lacquer solvents than is EAB 171.

EAB 272, in common with all cellulose acetate butyrates, offers yet other advantages. In the lacquer maker's plant and in the final coating, the low flammability of cellulose acetate butyrate reduces fire hazards. Lacquers based on these esters exhibit outstanding color stability and resistance to weathering.

All Eastman cellulose acetate butyrates are available in at least two viscosity ranges. They are shipped as a fine dry powder in 50-pound multiwall paper bags. These esters dissolve readily to give clear, water-white solutions, are convenient to handle and are non-hazardous in storage. Advice on a specific formulation problem is available from your Eastman representative. We welcome your inquiry.

Authoritative, detailed information on the various types of cellulose acetate butyrate, including their chemical composition, physical properties and their use as film formers in metal lacquers, wood finishes, and textile and paper coatings is contained in Eastman's new 72-page booklet, "Cellulose Acetate Butyrate for Protective Coatings." It is a comprehensive, complete source file of fundamental information, reporting the results of years of work in formulating, testing and evaluating coatings based on cellulose acetate butyrate. Make sure a copy is always at hand by writing to the address below for yours.

Eastman CHEMICAL PRODUCTS, INC.

subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE

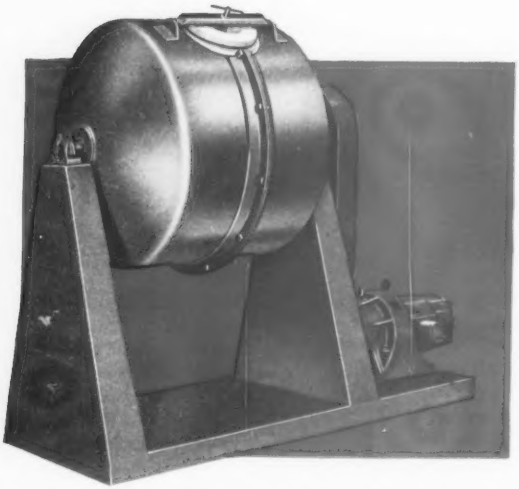
SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; New York City; Framingham, Massachusetts; Cincinnati; Cleveland; Chicago; St. Louis; Houston. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

MODERNIZE your milling operations with "U. S." BALL and PEBBLE MILLS

12, 27 and 52 gallon sizes have one-piece grinding jar securely held by dome-shaped steel heads and heavy steel tie rods.

It pays to replace obsolete, inefficient equipment with dependable "U. S." Mills. In small laboratory batches or full production, you get easier, faster, more economical milling. Uniform results cut costs, assure better quality control.

Built for continuous, trouble-free service and ease of operation, sturdy "U. S." units have heavy welded steel bases, heavy-duty bearings and precision balanced grinding jars for smooth running under all loads. The Burundum-fortified grinding jars give up to three times the wear of conventional porcelain. Wide mouths speed loading and discharging.



87, 117, 158 and 210 gallon sizes have three-piece Burundum-fortified lining completely protected by steel casing.

Larger production units are available with grinding drums unlined, or lined with rubber, buhrstone, high density porcelain, or high alumina ceramic.

HANDY HINTS on Milling

A fast, easy way to clean your mill after wet or dry milling is by wet milling with a charge of flint sand and grinding media. After discharging, rinse mill with water.

For more helpful milling data and complete description of "U. S." Grinding and Mixing Equipment, WRITE FOR BULLETIN 280.

U. S. STONEWARE

PROCESS EQUIPMENT DIVISION

AKRON 9, OHIO

106-F

NOW–add this Powerful Sales Point at lower-than-ever cost!

"Won't skin over" can be a potent additional reason to choose your coatings! You can now add this sales point—economically—with National Antioxidant B®!

National Antioxidant B is based on the essential ingredient that effectively retarded skinning in a wide range of formulations during the most exhaustive, unbiased tests ever reported*. Only 1 to 4 lb. per 100 gallons needed. There is no appreciable change in drying time, durability, odor or color retention.

If you haven't re-evaluated anti-skinning agents lately, we urge you to get a current sample and quotation on National Antioxidant B. It now costs little to put a lot of extra sales-appeal in your line.

National ASA® — if preferred for some formulations — is also available at new low cost. For odorless paints, we offer National Antioxidant D**.

*As reported in Official Digest, Paint & Varnish Production Clubs, November 1956
**Trade Mark

Allied Chemical

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Akron Atlanta Boston Charlotte Chattanooga Chicago Greensboro Los Angeles New Orleans Philadelphia Portland, Ore. Providence San Francisco Toronto

Let us prove it to you!

ISOPHTHALIC-BASED exterior house paints

are the NEW STANDARD OF QUALITY

Paint formulas developed from Isophthalic-based resins are becoming the talk of the paint industry. Long sought after improvements in paint quality are now possible from properties contributed to alkyd resins by Oronite* Isophthalic. Ask Oronite for the proof!

Better color retention Lengthy weather exposure testing has proved Isophthalic-based outdoor house paints to be greatly superior to oil type paints—particularly so in deep color tint retention. And because Isophthalic-based paints are more moisture-resistant immediately after application, colors do not turn flat.

Faster "quick-dry" and "through-dry" Amazing dry times have been achieved with Isophthalic-resin paints. This "quick-dry" characteristic greatly reduces film damage due to weather conditions—rain, fog, temperature change and dust.

Better original gloss and gloss retention Weather exposure and Weather-Ometer tests have shown the gloss retention of Isophthalic alkyd paints to be superior to oil type paints. This suggests far longer service from Isophthalic-based paints—even more so in deep colors.

Easy to apply—self leveling Because Isophthalic-based exterior house paints have better flow and self leveling properties, and, also, less tendency to wrinkle in thick films—better, longer-lasting paint jobs are obtained.

Ask your resin supplier about **ORONITE ISOPHTHALIC** or, contact Oronite directly for further information on the superior performance of Isophthalic-based alkyds.

ORONITE CHEMICAL COMPANY

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*T.M.

47-6

. . . masonry paints with ALKALI RESISTANCE

One of the many advantages of paints made with RHOPLEX AC-33, 100% acrylic emulsion is excellent resistance to alkali in damp or fresh masonry. To demonstrate this advantage, free films of emulsions were prepared from RHOPLEX AC-33 and two different competitive emulsion films. These films were then placed in a saturated lime water solution simulating the conditions encountered on masonry.

After six weeks' immersion, one film (left) has disintegrated into small pieces, producing a turbid suspension; the other (right) has also disintegrated into small particles. But the RHOPLEX AC-33 film (center) demonstrates its fine alkali resistance by showing almost no change in appearance with retention of tensile strength and elongation.

Excellent alkali resistance, adhesion over both new and previously painted surfaces, toughness and tensile strength retention after outdoor exposure—these are only a few of the reasons that an ever-increasing quantity of exterior paint is being formulated with RHOPLEX AC-33.

It would pay *you*, too, to investigate RHOPLEX AC-33.

Chemicals for Industry

ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

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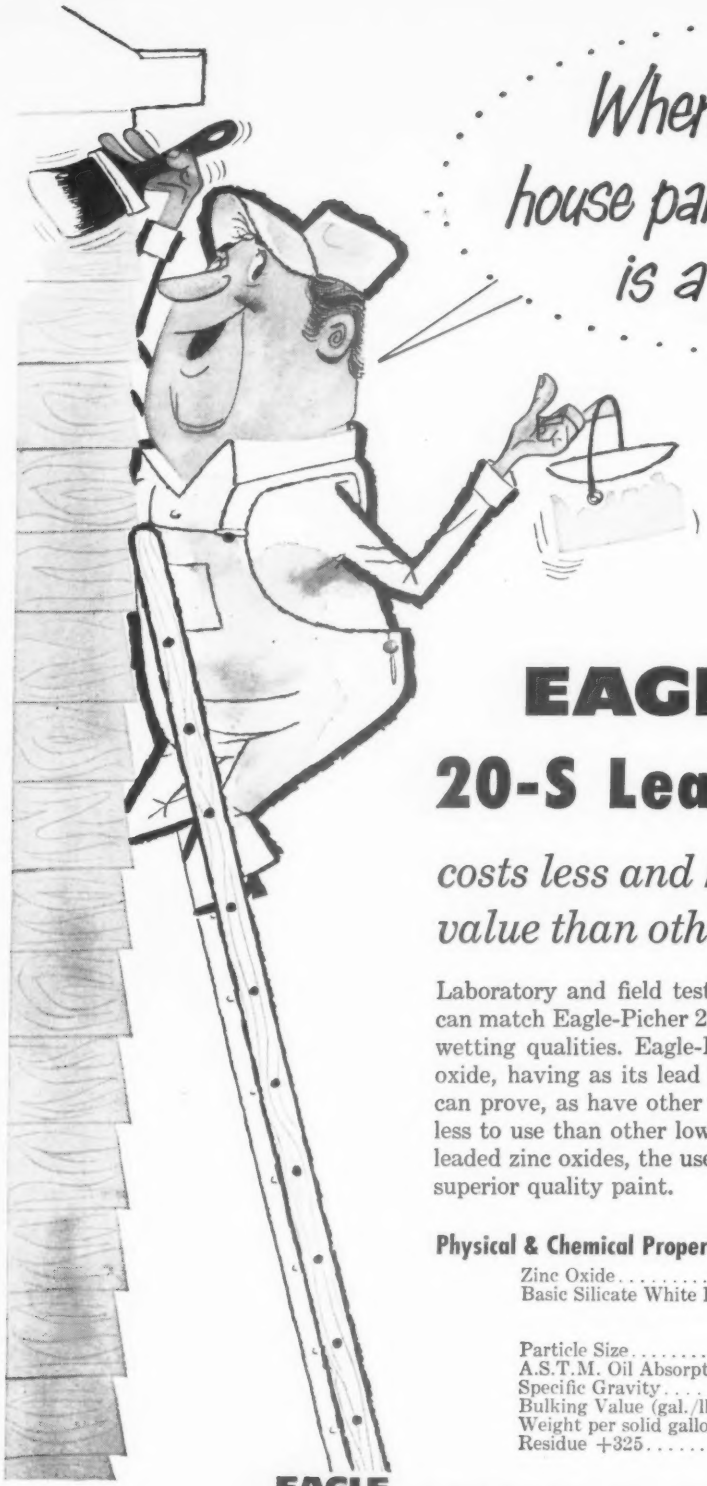

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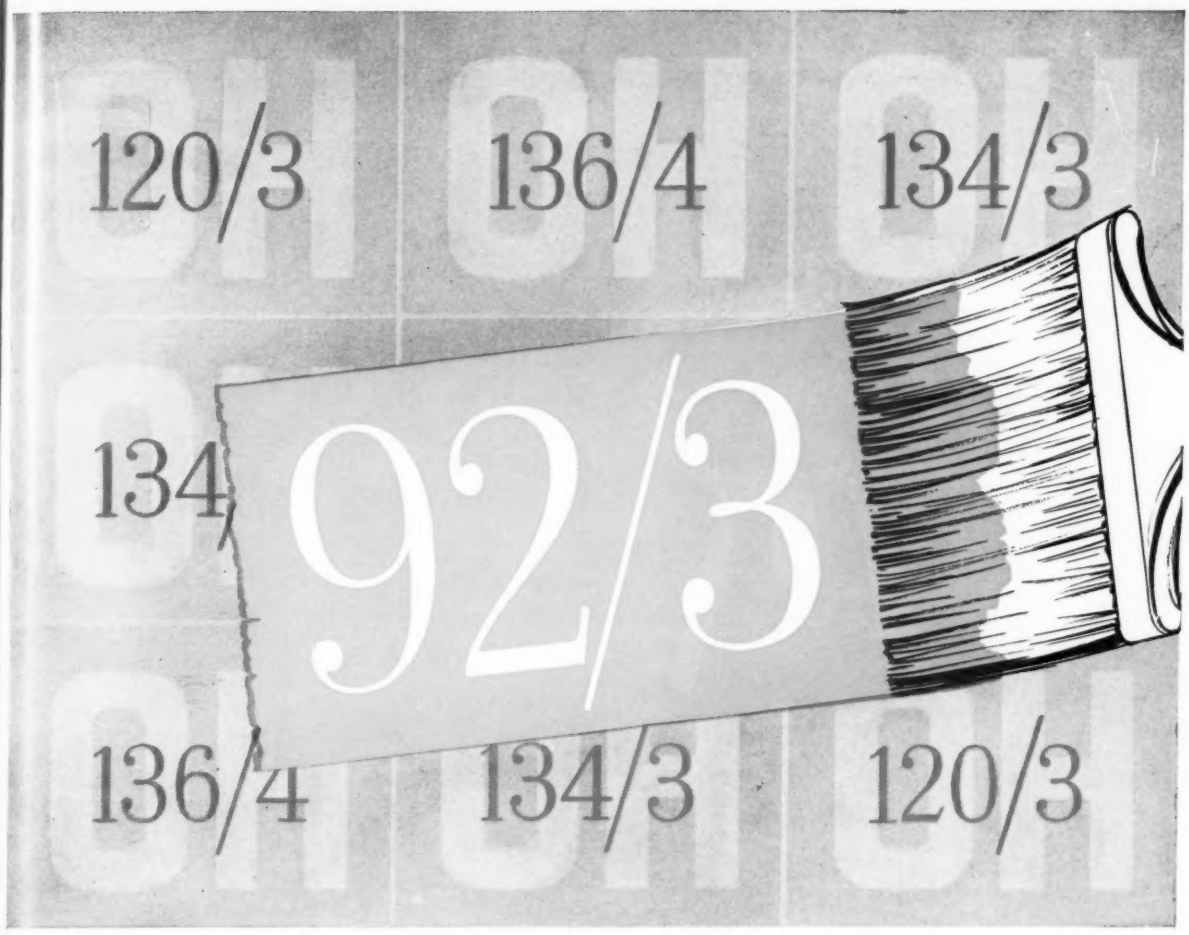

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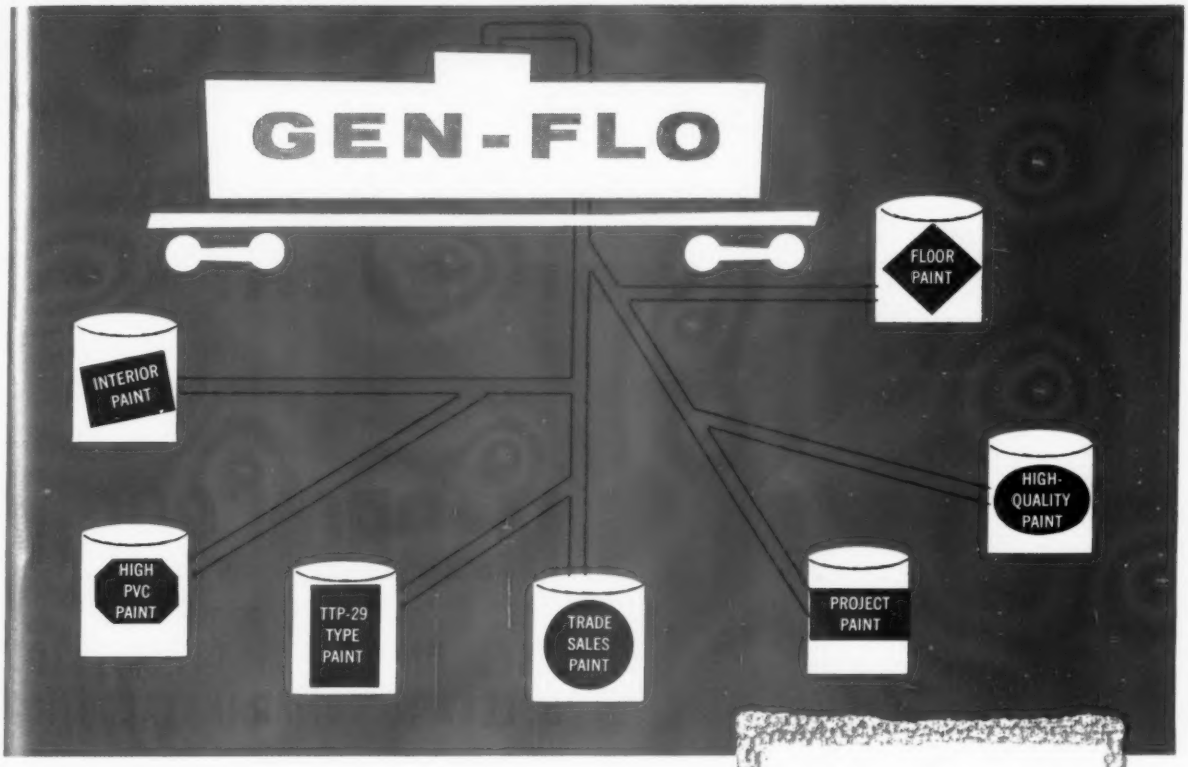

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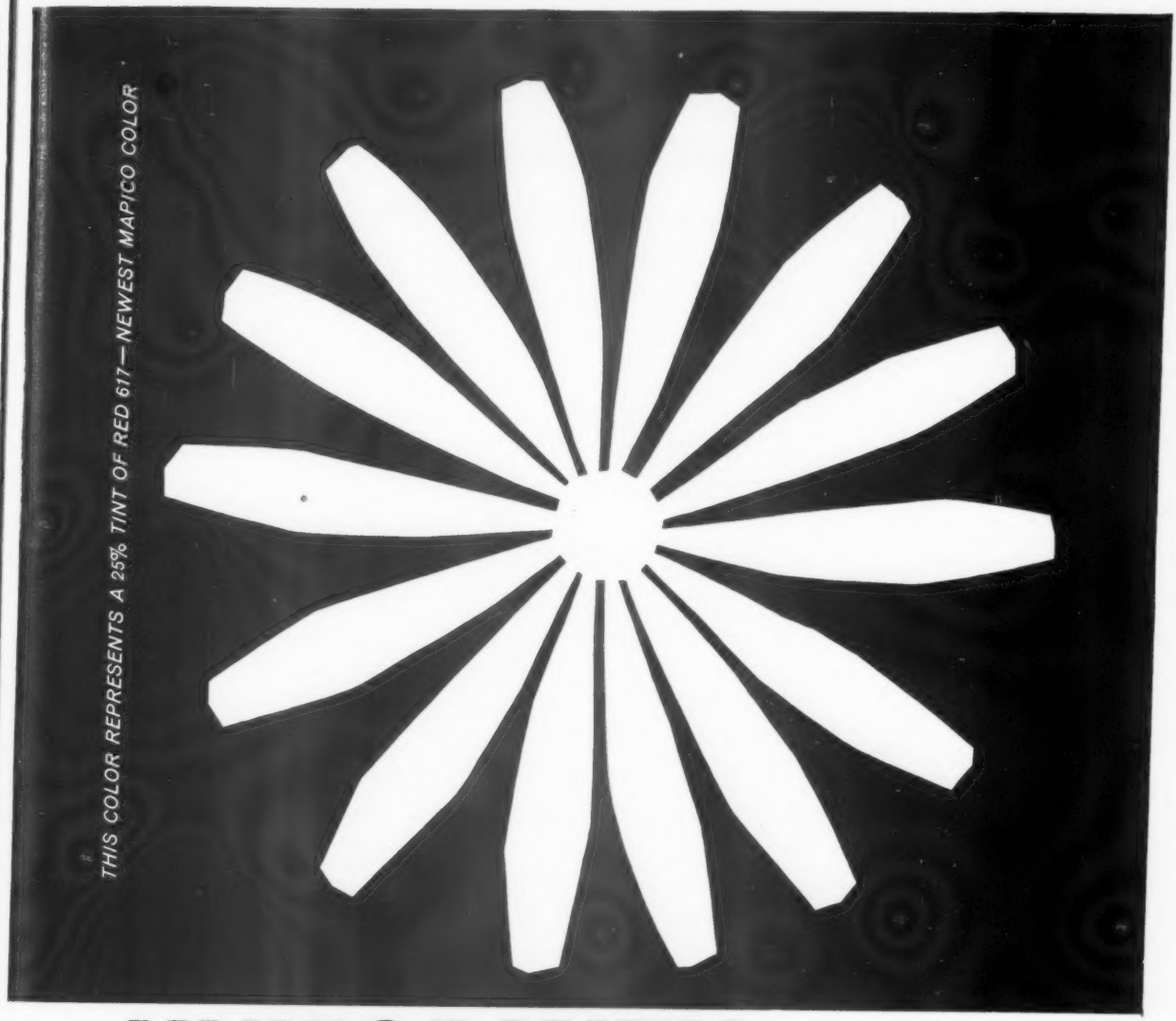

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PROPERTIES OF PHTHALOCYANINE PIGMENTS

Flocculation of Copper Phthalocyanine

By
Harold T. Lacey
George L. Roberts
Vito A. Giambalvo

A practical solution to the problem of flocculation of copper phthalocyanine blue in lacquers and synthetic automotive enamels has been presented. Substituted ammonium salts of o-carboxy benzamidomethyl phthalocyanines are highly successful in inhibiting floc growth. A small proportion of this material imparts flocculation resistance to normally flocculating pigments and extenders. The rate of floc growth has been measured microscopically, and these data have been correlated with practical evaluations.

These derivatives of copper phthalocyanine are more soluble in organic liquids than the unsubstituted pigment and it has been shown that the active derivatives are adsorbed on copper phthalocyanine pigment particles. It has been determined that these particles have an electric charge.

A theory for the action of these derivatives has been proposed, based on the formation of a solvent envelope surrounding the individual particles by a hydrogen bonding mechanism. Energies from such hydrogen bonding have been shown to be greater than the maximum estimated energy available for flocculation.

SINCE the discovery of copper phthalocyanine by de Diesbach (7) 30 years ago, it has become the most valuable and the most universally useful blue pigment ever known. Indeed copper phthalocyanine blue pigments have had a meteoric rise in popularity during the past 15 years. According to the U. S. Tariff Reports approximately 3½ million pounds were manufactured in 1955, valued at over 8 million dollars. One of the largest uses for these pigments is in the surface coating field, which includes the important automotive industry.

Deficiencies

In spite of their brilliant shade and extreme fastness to light and to chemical action there have been three inherent major deficiencies which have retarded their use in this field. These are (a) rheological properties, (b) crystallization, and (c) flocculation. The large number of commercial types of copper phthalocyanine pigments is largely the result of the efforts of pigment manufacturers to overcome these deficiencies for specific end-uses. Great progress has been made as indicated by the growing market, but there is still room for improvement which should result in even greater acceptance in the surface coating field. This is particularly true of flocculation. The problem of preventing flocculation or coalescence of pigment particles in automotive vehicles has proven to be both elusive and challenging.

This paper was a contribution from the Bound Brook Laboratories, Research Division, American Cyanamid Co., Bound Brook, N. J. and was presented at the 131st Meeting of the American Chemical Society, Division of Paint, Plastics and Printing Ink Chemistry.

Flocculation may be defined as the formation of clusters of particles in a vehicle which can be separated by relatively weak mechanical forces or by a change in forces at the interface between the liquid and the solid dispersed particles (8). The clusters or flocs are subject to forces such as Coulombic, van der Waals and related surface forces. In a flocculating type pigment, the flocs usually form rapidly in the vehicle when allowed to stand, but the turbulence in a spray gun is frequently sufficient to separate them and thus produce maximum color intensity.

Since copper phthalocyanine pigments are very strong tinctorially, they are seldom used at full tones strength but rather in tints or blends with colorlesr

pigments as substrata, such as titanium dioxide. They are also used in blends with other colored pigments to obtain different shades and hues.

Flocculation Resistance

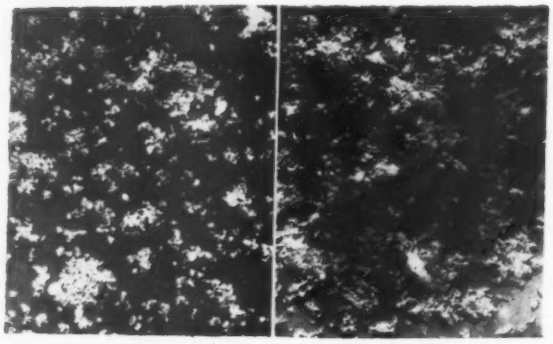
The property of flocculation resistance of the pigment in the vehicle is therefore of great practical importance in order to obtain the same optimum strength and shade under various conditions of storage and by various methods of application. For example, in the automotive industry it is frequently desirable to apply a protective coating to a car by spraying the body and by dipping smaller parts such as the fenders. When the colored pigment in a tint flocculates, the dipped portion is considerably weaker tinctorially than the sprayed area. If a portion of the car is touched up with a brush, a still different result may be obtained. The uneven tinctorial effects, obtained with a flocculating colored pigment, may be still further accentuated when it is used in blends with other colored pigments, because in this case not only the strength but the hue may be changed as well. The importance of a flocculation resistant pigment is therefore quite evident.

Previous workers in the field of producing a flocculation resistant copper phthalocyanine pigment have attacked the problem from different viewpoints. Loukomsky (18) and Wiswall (31) conditioned the pigment by grinding with salt in a solvent in order to reduce this tendency to flocculate. Brouillard and Giambalvo (6) flushed the press cake directly into solvents, thereby eliminating detrimental electrolytes. Mixed metal phthalocyanines have been prepared by a number of investigators to give crystallization and flocculation resistant pigments (2, 3, 5, 13, 19). The monosulfonated copper phthalocyanine and certain of its salts have been reported to be resistant to flocculation (9). Vesce (28) diluted the phthalocyanine pigment with approximately 50% aluminum benzoate. The results of these investigations have led to pigments that have varying degrees of flocculation resistance, but this improvement has often been achieved at the expense of one or more valuable properties such as strength, brightness, hue, or rheological behavior.

Crystallinity Effect

The problem of producing flocculation resistant copper phthalocyanine pigments is complicated by the fact that there are two commercially important crystal modifications. The stable crystal form is best obtained by salt grinding in a crystallizing solvent (18, 31) and is characterized by an intense, brilliant, greenish shade of blue. The metastable form, which is redder in hue, is usually obtained by an "acid-pasting" process; i.e. dissolving in conc. H_2SO_4 and precipitating by pouring into water. Each form has a characteristic infrared spectrum (14) and X-ray diffraction pattern (25, 17).

In Figure 1 at the left, (15) there is an electron micrograph of the salt-ground, stable crystal form of the pigment, shadowed with uranium. Note the uniform particle size and shape. The surfaces are smooth and promote good flow characteristics when incorporated in a vehicle. These physical properties of the pigment particles may account for the fact that this form is somewhat flocculation resistant, without further treatment.



Green Shade **Red Shade**

Figure 1. Electron micrographs of copper phthalocyanine pigments.

The electron micrograph at the right, Figure 1, shows a red shade pigment which has been conditioned by the acid-pasting process. Note the irregular crystallite shapes, non-uniform size and the tendency to form sponge-like flocs. This red shade pigment is desirable for the automotive industry. It is strong and brilliant in color but is not suitable for automotive finishes in this form because of its crystallizing and flocculating characteristics and poor rheological behavior in most organic vehicles. While a non-crystallizing product can be obtained by the introduction of chlorine atoms into the molecule, this does not affect the flocculating properties and the resulting pigment is also somewhat greener in shade and often weaker and duller.

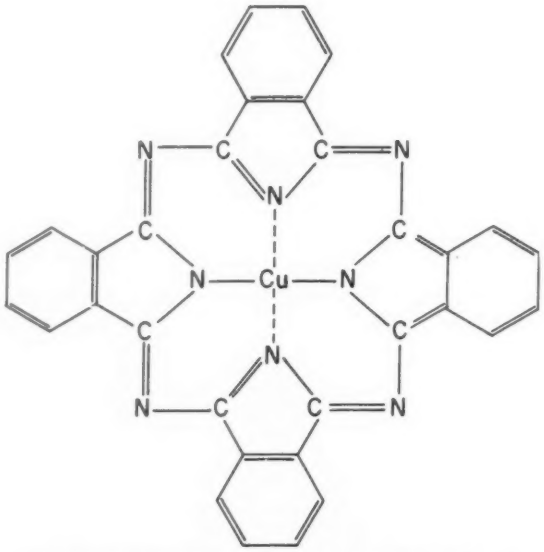


Figure 2. Structure of copper phthalocyanine.

Copper phthalocyanine is the copper chelate of tetrabenzotetrazaporphin (Figure No. 2). This is a unique molecule. Because of the resonance within the molecule, the four valences of the copper are essentially equivalent. This contributes to the great stability of this complex and at the same time ac-

counts for the intense color. The molecule is planar; it is also symmetrical containing a center and several planes of symmetry (17). As would be expected from this structure, only a small dipole moment is present.

Discussion

In attempting the preparation of a flocculation resistant pigment, the first objective was to alter the polarity of the molecule by introducing an electrical charge synthetically. The initial hypothesis assumed that, if such a charge on the molecule could be concentrated at the surface of the particle, these working ultimates of the pigment would repel one another.

This objective was accomplished by making various acid derivatives of copper phthalocyanine and then forming salts such as ammonium salts. The ammonium salts did confer positive charges upon the pigment particles as proven by electrophoretic response using either microscopic or macroscopic techniques (4, 24, 1).

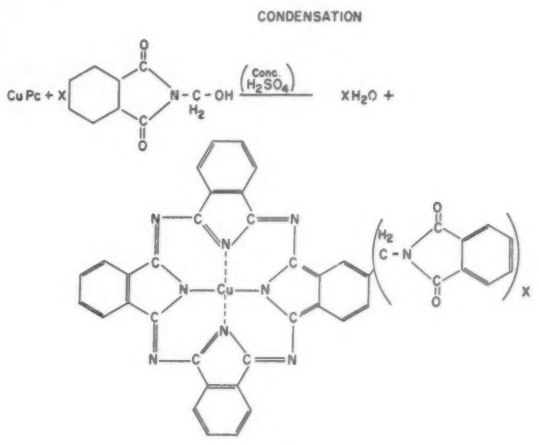


Figure 3

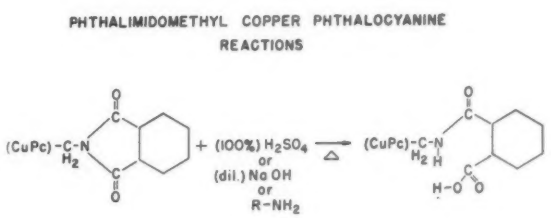


Figure 4

Some of these products showed remarkable flocculation resistance in automotive enamels and lacquers. The best derivatives for this purpose were the alkyl ammonium salts of mono-o-carboxy-benzamidomethyl copper phthalocyanine. These derivatives as indicated in Figures 3, 4, were prepared by first condensing N-methylolphthalimide with copper phthalocyanine in a dehydrating acid medium such as concentrated sulfuric acid or polyphosphoric acid (16). N-methylolphthalimide can also be formed in situ in this reaction by adding paraformaldehyde and phthalimide in the proper proportions.

When concentrated sulfuric acid is used as the dehydrating medium, the bis-phthalimidomethyl ether has been isolated as a byproduct in these condensation reactions. There is evidence that phthalimidomethyl acid sulfate is an intermediate in its formation. While the mechanism of the condensation is not clear, it has been established that the bis-phthalimidomethyl ether can be condensed with copper phthalocyanine under conditions similar to those used with methylolphthalimide to give the mono-phthalimidomethyl copper phthalocyanine. It has not been proven whether the formation of the ether is a necessary intermediate step in these condensations.

The phthalimidomethyl phthalocyanine derivative can be partially hydrolyzed to the o-carboxybenzamidomethyl derivative (Figure No. 4) in a number of ways; (16) (a) in concentrated sulfuric acid at a higher temperature, followed by aqueous dilution, (b) boiling with dilute caustic solution, (c) heating with ammonium hydroxide under pressure or (d) boiling with an excess of aqueous organic amine.

Properties Derived

Salts formed by reacting primary organic amines and particularly ethylene diamine with the mono- or di-substituted derivatives have not only flocculation resistant—but also crystallization resistant—properties in both automotive lacquers and synthetic enamels. These excellent properties are maintained when as little as one part of the ethylene diamine salt of the mono-o-carboxybenzamido-methyl derivative is mechanically blended with twenty parts of copper phthalocyanine pigment and the rheological properties of this blend are superior to those of either component (27).

The new flocculation-resistant, crystallization-resistant red shade copper phthalocyanine, made by the above procedure, also has an exceptionally clean reddish undertone and tint and full toner strength. By comparison, some of the older commercial types may be as low as 50% in strength, and others are greener and dirtier in shade.

Product	"P"	"R_s"
Ortho carboxybenzamidomethyl copper phthalocyanine (RNH_3^+salt)	100	98
Commercial Pigment - A	285	89
Commercial Pigment - B	106	46
Commercial Pigment - C	150	94

The center column ("P") indicates the parts of pigment used, to obtain equal tinctorial intensity and in the last column the higher "R_s" values indicate greater flocculation resistance. (See Experimental Section.)

Table I

Furthermore, when ground in a ball mill with a short oil oxidizing type alkyd resin such as Rezyl* 387-5, the mill base of the new pigment maintains its low consistency and good flow for at least eight months. (many of the previous types form stiff gels under the same conditions). Likewise, when made into lacquer or enamel tints with titanium dioxide, the product has outstanding shelf stability, showing little change in properties over a period of several months. Table I shows a comparison of this new red shade pigment with some of the types now on the market prepared by other methods.

*Reg. U. S. Patent Office, American Cyanamid Company

Theory

A theoretical consideration of the properties of pigments in surface coatings should not be concerned with the pigment particles alone but with the entire system. The flocculation of pigment particles in any system is dependent upon both the pigment and the other constituents present.

Type	Vehicle	Solvent Name	Solvent Dipole Moments (Debye Units)
Lacquers	Nitrocellulose	Esters	3.0
		Alcohols	2.5
		Ketones	2.8
		Xylene	0.1–0.5
Enamels	Alkyd-Melamine Resins	Xylene	0.1–0.5
		Butanol	2.5
Alkyd Flats	Alkyd Resins	Aliphatic Hydrocarbons	0.

Table II. Composition of Vehicles.

Table II indicates the composition of the vehicles in which these pigments have been tested. It can be seen from the dipole moments of the solvents in this table, that the polarity is markedly different. In lacquers, the film forming substances are usually dissolved in mixtures of highly polar solvents such as esters, ketones and alcohols with a small amount of aromatic hydrocarbon such as xylene. In enamels, where xylene is the major solvent, the polarity is lower. In alkyd flats, the resin is dissolved primarily in aliphatic hydrocarbons. This system exhibits the least polarity and the pigment shows the least flocculation resistance.

It is recognized that, in commercial pigmented systems, the pigment is seldom dispersed to its ultimate particle size but rather to small flocs or aggregates. Further flocculation is undesirable since it will lead to loss in color value. Experimentally it has been determined that floc sizes up to one micron can be tolerated without serious impairment of tinctorial strength. The average stable floc size of the new flocculation-resistant copper phthalocyanine pigment is of this order. The system under consideration is therefore one of controlled floc size rather than non-flocculating in the strict definition of this term.

To explain the nature of flocculation, it is necessary to consider the forces responsible. It has been shown that flocculation is predominately caused by the driving force resulting from the high surface free energy, which is a function of both the nature of the surface and the size of the particles. (This is an application of the Second Law of Thermodynamics) (21). The effect of gravitational forces is minor (approximately 10^{-11} kcal./mole.) and can be disregarded. The estimated energy available for flocculation per mole of solid may be computed from the product of the surface free energy per cm^2 and the surface area in square meters per gram, according to the following equation:

$$E = \frac{\text{erg}}{\text{cm.}^2} \times \frac{\text{M}^2}{\text{gm.}} \times \frac{\text{cm.}^2}{\text{M}^2} \times \frac{\text{joules}}{\text{erg}} \times \frac{\text{kcal.}}{\text{joules}} \times \text{Mol. Wt.}$$

$$E = 1000 \times 10 \times 10^4 \times 10^{-7} \times 0.24 \times 10^{-3} \times 576$$

$$E = 1.3 \text{ kcal./mole}$$

This calculation is based upon the following three conditions:

1. The working ultimates are spherical in shape.
2. The average diameter is one micron.

These first two conditions are approximately correct.

3. The surface free energy for copper phthalocyanine is no greater than that which has been determined for inorganic solids, such as MgO (12), ca. 1000 erg./cm^2. This third condition is believed to be a fair assumption, although it has not been determined experimentally.

Spheres of one micron diameter would have a calculated surface area of ca. 10 M^2/gm. Using these two figures and the conversion factors as indicated, the maximum surface free-energy for these particles would be approximately 1.3 kcal./mole. The growth of flocs is caused primarily by this high surface energy. In order to diminish the tendency to flocculate, sufficient energy to exceed this value must be imparted to the system.

The effect caused by the synthetic changes made in the phthalocyanine molecule can be interpreted in terms of these calculations, as follows:

The Charge Effect

The final step in the synthesis results in the formation of a substituted ammonium salt of the o-carboxybenzamidomethyl derivative (see Figures 3 and 4). As indicated in Table III, when examined either by microscopic or macroscopic techniques, these pigment particles show an electrophoretic response in either strongly ionizing or relatively weakly ionizing media (4). The charge on the particle does tend to repel particles of like charge but this force is not sufficient to overcome the free surface energy. For example, even if each molecule were mono-substituted and even if complete ionization were obtained, this would give at the most an energy in the order of 1.5 kcal./mole. (This force is calculated from the charge of 4.8×10^{-10} e.s.u. per molecule, using the standard equation and a value for the dielectric constant of 30.) This would be barely sufficient to overcome the flocculating forces. In practice these two conditions are never fully met and therefore this order of repelling force is not attained from the charge on the particles.

Media / Compound	Water Charge	Nujol Charge	R_s
OCBM Copper Phthalocyanine	Negative	None	46
Ethylene Diamine Salt	Positive	Positive	98

OCBM = Ortho Carboxy Benzamido Methyl

Table III. Electrophoretic Response.

Thus, while the original objective of synthetically placing a charge on the pigment particles was achieved, a complete theoretical explanation of the results obtained must include additional sources of energy.

The Solvent Effect

Since it was determined that the flocculation resistance of this material varied with the solvent polarity, the attractive forces of the solid for the solvent or solute (resin, etc.) were then investigated.

Over-simplified perhaps, the effect of the polarity

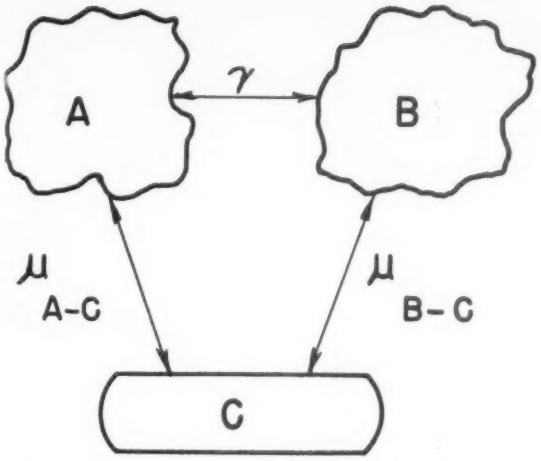


Figure 5. Components of pigment-vehicle systems.

of the solvent may be represented as follows: (Figure No. 5). "A" and "B" are pigment particles (working ultimates) and "C" is either a molecule of solvent or resin. Therefore, this may be considered a three unit system. The force relationships (γ(between "A" and "B" are expressed as surface free energies (attraction), but those between "B" and "C" and between "A" and "C" may be chemical in nature involving H bonding and, as indicated, can be expressed as a chemical potential (μ). Therefore, the net energy for this system may be written as shown below:

$$E_n = \mu_{(A-C)} + \mu_{(B-C)} - \gamma$$

E_n = Net Energy

$\mu_{(A-B)}$ and $\mu_{(B-C)}$ = Chemical Potentials

γ = Free Surface Energy

If the net energy is positive there is greater attraction of the pigment particles for the solvent than for each other, resulting in smaller stable flocs.

Complexes

By way of further explanation, Figure No. 6 illustrates a possible mechanism. Initially (I) the substituted molecules may be in the interior of the "working ultimate" or at the interface. Due to greater solubility and faster rate of solution, substituted molecules at the interface will go into solution exposing fresh surface. This fresh surface will then contain other substituted molecules (II). This in effect would transfer material from the interior to the interface. In (III), both the molecules at the interface and in solution have formed solvated "complexes" with molecules of solute or solvent.

These complexes, according to this interpretation, could be brought about by the fact that the substituted ammonium group attracts the electro-negative portions of solvent molecules. Since the substituted ammonium salt is not completely ionized, it serves as a bridge between the solvent and particles of copper phthalocyanine. The net effect is to surround

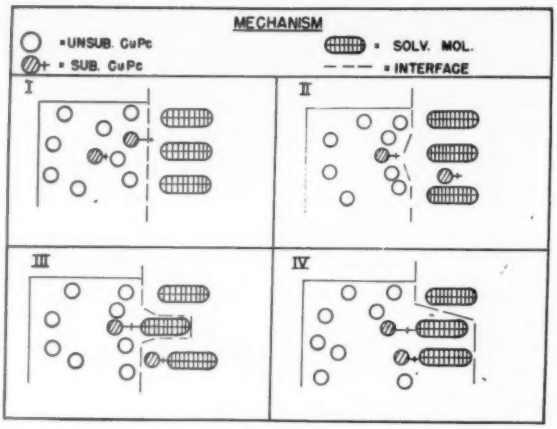


Figure 6

the "working ultimate" with an envelope of solvent, which prevents the close approach of neighboring particles. Hydrogen bonding would thus be involved and chemical energies of this type may be as high as 5-10 kcal./mole— (22) more than sufficient to overcome the estimated maximum surface free energy of 1.3 kcal./mole. The more polar vehicle systems provide greater opportunity for hydrogen bonding. According to this theoretical explanation, this pigment should show better flocculation resistance in lacquers and enamels than in mineral spirit systems. This agrees with the facts.

In (IV) the additional step of re-adsorption of the substituted product has been postulated for the reason that a blend of this substituted material (one part by weight) with unsubstituted copper phthalocyanine (19 parts) is as flocculation resistant as the original substituted product. These solvated molecules can be readsorbed on the particle from which they originated, or adsorbed on any particle which has an affinity for them. The substituted molecules will carry the solvent with them and form a similar protective envelope about the adsorbing particle.

Preparation of Test Panels

The testing of the products prepared by procedures outlined in the Synthesis section of this paper are as follows. Each sample was tested in either automotive enamel or lacquer for flocculation resistance (29) and in addition its color was determined by measurement with the G. E. recording spectrophotometer (23). Table II (see Discussion) gives the composition of vehicles for the colored and white lacquers and for the automotive enamels. The pigments were dispersed by adding the pigment and vehicle with pebbles to a 6-oz. jar and rolling for 24 hours. The base enamel or lacquer was then tinted, diluted to spraying consistency by the addition of solvent, and an aluminum panel was sprayed. The spray coat was allowed to dry and the identical lacquer or enamel was poured over the bottom half of the panel. The panel was then placed in a vertical position until the poured coat had completely dried.

Measurement of Color Intensity

The measurement of color intensity was carried

EXPERIMENTAL SECTION

Synthesis

Mono-Phthalimidomethyl Copper Phthalocyanine from Phthalimide and Paraformaldehyde.

20 g. of copper phthalocyanine was added with stirring to 280 g. of 96% sulfuric acid at 50-55°C. 10.5 g. of paraformaldehyde was then added, followed by 30.5 g. of phthalimide. The reaction mixture was stirred at 50-55°C. for 2 hours and then drowned in 1 liter of ice water. The product was filtered and washed acid free. It was purified by reslurrying in acetone, filtering, washing to a colorless filtrate with acetone and then with water. After drying, 24.3 g. (95.3% yield) of the mono-phthalimidomethyl copper phthalocyanine was obtained as a bright blue solid. Analysis Calculated for $C_{41}H_{21}O_2N_9Cu$:

C, 67; H, 2.85; N, 17.2; Cu, 8.66.
Found: C, 66.8; H, 3.02; N, 17.3; Cu, 9.05.

Similar results were obtained when 30 g. of N-methylolphthalimide was used instead of the paraformaldehyde and the phthalimide in the above example.

Mono-Phthalimidomethyl Copper Phthalocyanine from Bis-phthalimidomethyl Ether.

5 g. of copper phthalocyanine was stirred into 70 g. of 100% sulfuric acid at 50-55°C. When solution was complete, 7.85 g. of bis-phthalimidomethyl ether was added. The temperature was raised to 70°C. and maintained for 22 hours. The solution was then drowned in 500 ml. of ice water. After purifying the product as described above, 5.7 g. (90% yield) of mono-phthalimidomethyl copper phthalocyanine was obtained.

Analysis Calculated for $C_{41}H_{21}O_2N_9Cu$:
N, 17.2; Cu, 8.66.
Found: N, 17.4; Cu, 9.4.

Di-Phthalimidomethyl Copper Phthalocyanine

10 g. of copper phthalocyanine was dusted into 140 g. of 100% sulfuric acid at 50-55°C., followed by 15.25 g. of phthalimide and 5.5 g. of paraformaldehyde. The reaction mixture was heated to 70-75°C. and maintained at this temperature for 22 hours. The product was isolated and purified as in the previous examples. The yield was 14.1 g. (91%).

Analysis Calculated for $C_{50}H_{26}O_4N_{10}Cu$:
C, 67.2; H, 2.9; N, 15.7; Cu, 7.1.
Found: C, 66.0; H, 3.14; N, 15.0; Cu, 7.02.

Alkylammonium Salt of o-Carboxybenzamidomethyl Copper Phthalocyanine.

20 g. of mono-phthalimidomethyl copper phthalocyanine, prepared as described above and retained as a wet press cake, was reslurried and heated to the boil in 200 ml. of water containing 20 g. of 68% ethylene diamine solution. After boiling for 2 hours, the product was filtered, washed free of excess diamine, dried at 55-60°C. and ground to pigmentary size. The pigment so obtained was resistant to flocculation and to recrystallization.

out on the G. E. recording spectrophotometer by measurement of the reflectance at 675 mμ. The R_s was calculated from the following equation:

$$R_s = \frac{I_p}{I_s} \times 100$$

where R_s = the ratio of the poured to sprayed color intensities. I_s = the color intensity at 675 mμ for the sprayed portion of the panel and I_p = the color intensity at 675 mμ for the poured portion of the panel.

Solubility of Derivatives of Copper Phthalocyanine

The solubilities of various derivatives of copper phthalocyanine were measured semi-quantitatively by the following procedure.

5 grams of pigment was slurried by stirring in 200 ml. xylene for 24 hours at 50°C. The resulting slurry was filtered by gravity and the filtrate absorbance at 675 mμ was measured on the G. E. recording spectrophotometer. Table (IV) lists the derivatives and

t = 50°C. ± 2.0	1 cm. E sat. λ = 675 mμ	Relative Solubility
Phthalimidomethyl-	1.52	1.000
Ortho-carboxybenzamidomethyl-(RNH_3^+salts)	1.00	0.658
Copper phthalocyanine-	0.19	0.123
Phthalimidomethyl-(after adsorption on copper phthalocyanine)	0.31	0.203

Table IV. Solubilities of copper phthalocyanine derivatives in xylene.

their relative solubilities as predicted from the intensity of absorbance at this wavelength. These values were difficult to obtain because of the low solubility. However, the order of solubilities is more significant. The last line of this table indicates the quantity of dissolved phthalimidoemthyl derivative remaining after adding copper phthalocyanine to the first sample and stirring 20 minutes at 50°C.

Measurement of Floc Growth-Microscopic

Many non-functional methods have been used to measure the amount of flocculation occurring in particular systems. Among these are dielectric constants (30), conductance (20), rheology (10), sedimentation (26) and microscopic methods (11). A modification of the latter method was used in this investigation because it gave better correlation with practical evaluation (See Figure 7).

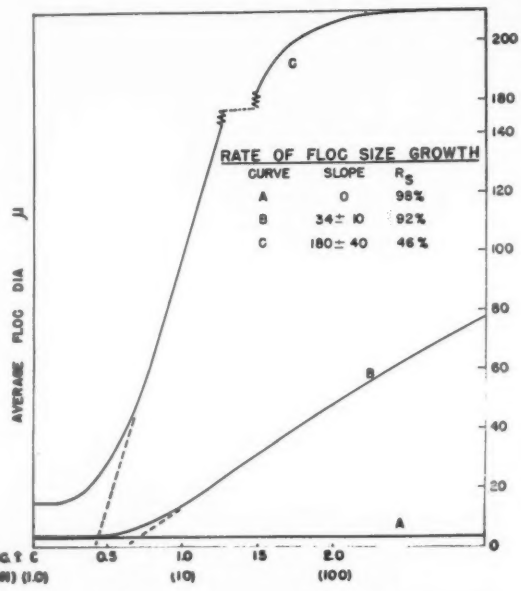
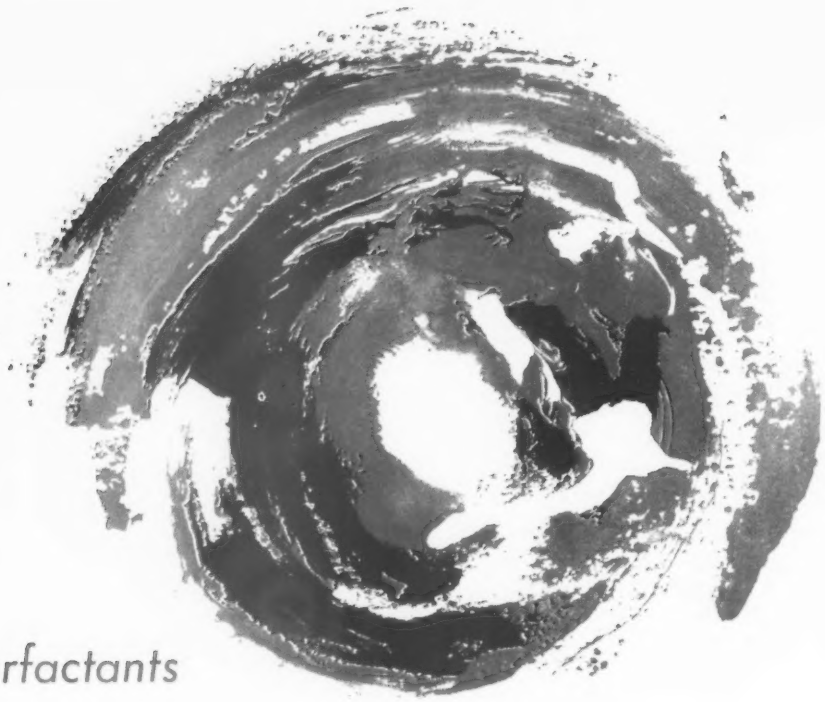


Figure 7. Microscopic measurement of floc growth.

Pigment samples were dispersed in lacquer vehicle. The resulting lacquer was not tinted by the addition of a white pigment, but was maintained in the clear transparent form and diluted to spraying consistency. A portion of the lacquer was placed on a microscope slide and the lacquer was deflocculated by applying pressure to the microscopic slide cover. At various intervals the average size of flocs formed was judged

(*Turn to page 92*)



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A Staff Report

PETROCHEMICALS for PAINT

PART III

Basic Chemistry of Petrochemicals (continued)

Naphthenic Hydrocarbons

As already indicated, the naphthenes or naphthenic hydrocarbons are cyclic materials which are not aromatic. Cyclohexane, for example, is present in certain crudes along with substituted cyclohexanes. The concentration of the naphthenic hydrocarbons is usually very low and special techniques are required for their recovery. If they are recovered, they may be used as solvents, or they may be dehydrogenated to aromatic compounds. Also, catalytic methods are available for isomerizing naphthenes. An example of this operation is the conversion of methyl cyclopentane to cyclohexane.

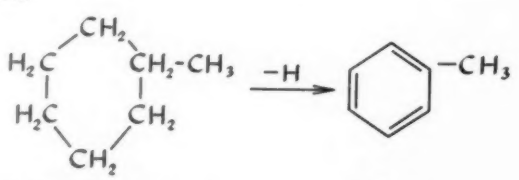
Related to the naphthenes are the naphthenic acids which are the most important acidic oxygenated compounds found in crude oils. Their typical structures have been indicated earlier in this series. Various alkyl groups may be attached and the higher molecular weight naphthenic acids may have two rings present. Ordinarily, the carboxyl group is not attached directly to the ring but rather is attached through one or more methylene groups. Normally, the rings have five carbon atoms although some six carbon naphthenic acids have been isolated.

The most important use of the naphthenic acids is in making metal naphthenates for use as driers by the paint industry. Their virtue for this purpose is that the degree of hydrolysis of the metal salts is very low. Also, because of their cyclic structure, they tend to be quite soluble.

Aromatic Hydrocarbons

For many years the production of aromatic chemicals such as benzene, toluene and xylene was the province of the industry which converted coal into coke and recovered the volatile by-products. In the late 1940's, however, it became apparent that the by-product aromatics from coking could not supply the obvious potential.

As indicated above, one of the procedures for obtaining aromatic hydrocarbons is to dehydrogenate the cyclohexane and related materials found in the naphthenic fractions of petroleum. Actually, this was the first commercial procedure. This is still the most important method for obtaining hydrocarbons from petroleum. It is interesting to note that benzene, toluene and xylene do appear as such in petroleum but in such low concentration that it normally is not economical to isolate them. However, when fractions containing them are further treated to convert the naphthenes present to aromatics, the economics are feasible. Just as benzene is produced by the dehydration of cyclohexane, toluene results when methyl cyclohexane is dehydrogenated. Also, however, dimethyl cyclopentane yields toluene in a reaction involving both dehydrogenation and isomerization.



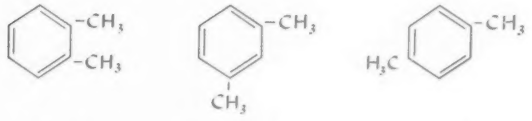
Methylcyclohexane Toluene

Aromatics are also produced in several processes common to the petroleum industry such as platforming and fluid hydro-forming. These are both operations conducted in order to improve gasoline and the conversion of the naphthenes to aromatics is only one of several reactions which takes place.

Another source of aromatics is as a by-product in the very high temperature cracking of oils, specifically for the purpose of producing unsaturates. Aromatics also result when normal paraffin hydrocarbons are cyclized and aromatized by the use of appropriate catalysts at either atmospheric or super-atmospheric pressures.

In all of the processes mentioned, the important problem is to separate the aromatics in sufficiently pure form for use as chemicals. Normal distillation, extractive distillation and solvent extraction are employed for this purpose. The net result is that in 1956 the petrochemicals industry provided an estimated 3.5 billion pounds of aromatic and naphthenic crudes for processing into compounds like benzene, toluene and the xylenes. The corresponding estimated figure for aliphatic hydrocarbons for 1956 is 14.4 billion.

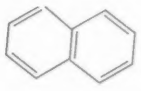
Ortho-, meta- and para-xylenes which have the following structures may actually be separated by distillation and low temperature crystallization.



Ortho-xylene Meta-xylene Para-xylene

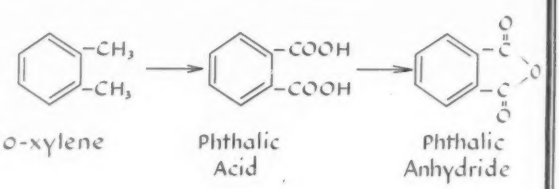
Meta-xylene, which is the most difficult to purify, may be selectively sulfonated and then converted back to meta-xylene by hydrolysis.

Aromatics higher than the xylenes are produced in certain processes like catalytic reforming. Even naphthalene, which has the following structure



may be produced from petroleum either by recovery of what exists in petroleum naturally or by synthesis. As the petrochemical industry develops, undoubtedly many other pure aromatic hydrocarbons will become available. A very recent one is durene or tetramethylbenzene. Durene may be oxidized to a tetracarboxylic acid, pyromellitic acid, which is useful as a curing agent for epoxy resins.

The paint industry makes use of these aromatic hydrocarbons as solvents and this will be discussed in detail later. As already indicated, benzene is a starting material for styrene and for phenol. Toluene is the basis for benzoic acid which finds some use as a chain stopper in short oil alkyd resins. Ortho-xylene may be oxidized to phthalic anhydride whose importance to the paint industry has already been discussed. Meta-xylene may be oxidized to isophthalic acid which promises to be important in the production of alkyd resins and also certain polyesters. The conversion of ortho-xylene to phthalic anhydride is indicated in the following equations.



o-xylene Phthalic Acid Phthalic Anhydride

Naphthalene, of course, may be converted to phthalic anhydride by direct oxidation although most of the naphthalene produced today still comes from sources other than petroleum.

Miscellaneous Materials

Petroleum Resins

The petroleum industry is also responsible for certain other materials of interest to the paint industry which do not fall into the above category. Primarily, we are concerned here with the cheap petroleum resins which result when petroleum is de-asphalted with propane as a solvent. These also result from the clay treatment of thermally cracked naphthas. In the latter instance, the clay actually acts as a catalyst in order to cause the naphtha fragments to condense into resinous substances. These petroleum resins, which are low in price, find relatively wide application in surface coatings.

Cresols

Another group of materials of interest is the so-called cresylic acids or cresols. These are substituted phenols which are obtained by extracting certain refinery fractions with caustic. Since the phenolic cresols are alkali-soluble, they are extracted and removed from the alkaline layer by acidfiication. The cresylic acids are used like phenol in the preparation of phenolic resins. Also, they provide the basis for the important plasticizer and gasoline additive, tricresyl phosphate, which is also used to a small extent in some specialty protective coatings. Cresols are of great importance to the paint chemist because of their use as solvents for wire coatings. Originally, cresols were obtained entirely from the coal tar industry.

Carbon Black

Another product of the petrochemicals industry of interest to the protective coatings industry is carbon black. Carbon black is used widely as a pigment. It is manufactured by the partial combustion of methane or natural gas by impinging the flame of the gas against a cool iron surface.

Carbon black is the most widely used of all of the black pigments in the paint industry. It is produced by two major processes. One is known as the channel process and provides a pigment with a truer black color. Here, natural gas is treated to remove any residual gasoline after which it is burned in low sheet iron buildings containing several thousand burner tips. Burning takes place in an insufficient supply of air so that a luminous flame results which impinges

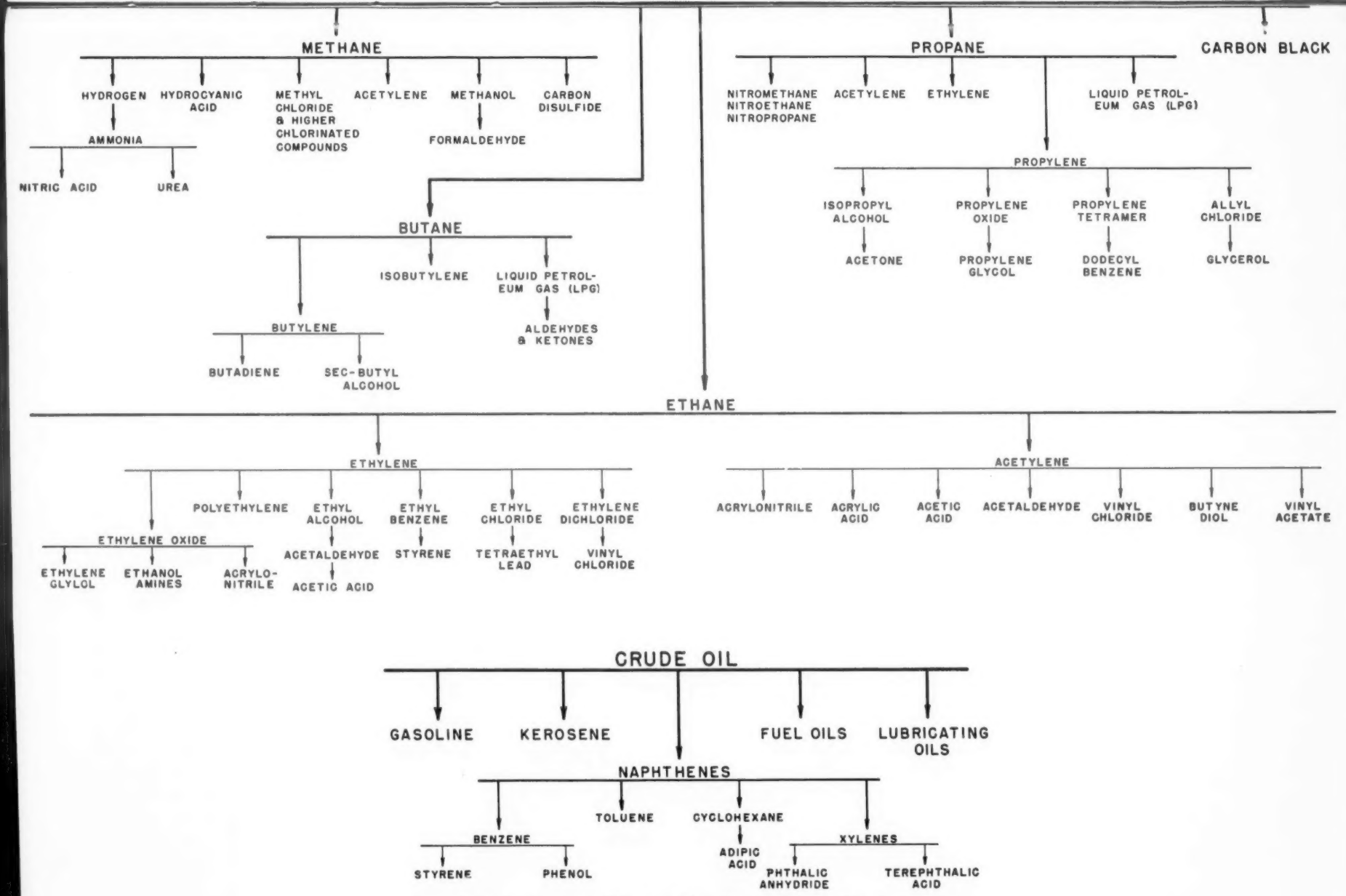


Table I — Important Chemicals from Natural Gas and Crude Oil

on the underside of iron channels. These mild steel channels move continuously backwards and forwards passing over stationary scrapers which remove the carbon as it is produced.

The second process is known as the furnace process. Here the combustion takes place in a confined refractory chamber. Blast gasses are used at a temperature of 2500°F. and the raw material may be natural gas fortified with liquid petroleum, natural gasoline, gas oils, fuel oils or so-called residuum. Again, only partial combustion takes place on the feed which is pre-heated prior to the time that it enters the furnace. The air which is forced into the furnace for the partial combustion is not pre-heated. Thus, the relatively hot and cold streams mingle and cause instant heat transfer and pyrolysis of the incoming gas to carbon particles. These particles are led through flues to a spray cooling tower and are collected by an electrostatic precipitator.

Carbon black also results from the partial oxidation of very high boiling aromatics which result from catalytic and thermal cracking.

Wax

A final material of interest to the paint industry, to a small degree, is the wax which is normally obtained in petroleum processing. Wax may be chlorinated to obtain materials which are recommended for use in fire retardant paints. Also, the wax may be cracked to obtain straight chain olefins of the type already discussed. A great deal of work has been done on the oxidation of wax to obtain both mono and dibasic acids although these have not replaced fatty acids in protective coatings formulations.

Summary of Petrochemical Operations

The above discussion (see Feb. and Mar. issues, also) has touched only the highlights of the processes for making chemicals by petrochemical operations. Actually, over one thousand chemicals may be produced from the raw materials indicated above. As a source of reference, Table I will be of interest to the reader.

In this table the important chemicals are shown which come from natural gas and crude oil. This table is limited largely to the so-called basic chemicals, although distinction between basic and derived chemicals is sometimes a bit hazy. No attempt has been made to be complete although the important operations which lead to raw materials for resins and intermediates have been included.

Table II will also be of value to the reader from the point of view of reference. In this table, chemicals available from the various petrochemical starting materials are listed. Again, it has not been possible to be complete and certainly all of the products mentioned are not of interest to the protective coatings industry. Both Tables I and II, however, will be of value in orienting the reader into the overall field of petrochemicals and in providing perspective to show where the petrochemicals industry interrelates with the protective coatings industry.

To summarize at this point, of all the materials of petrochemical origin listed in Tables I and II, the following deserve special mention because of their importance to the petrochemical industry. Acetaldehyde which comes from methane, ethylene or propane is useful in resins and for the manufacture of chemicals such as pentaerythritol. Acetone which comes from propylene, and as a by-product of the cumene process for phenol, is important in solvents and plasticizers. n-Butanol, which comes from acetaldehyde, is important as a solvent. Epichlorohydrin, which is one of the important derivatives of propylene, is basic for resin manufacture. Ethyl alcohol from ethylene is an important solvent. Formaldehyde, which may come either from methane or butane, is important for resins and for chemicals such as pentaerythritol. Glycerol, which comes from propylene, is important in resins and in plasticizers. Isopropyl alcohol, another propylene derivative, is an important solvent. Maleic anhydride, which comes from benzene, finds use in resins. Methyl ethyl ketone, which comes from butylene, and methyl isobutyl ketone, which comes from propylene, are both important solvents. Naphthenic acids, which are obtained by direct recovery from petroleum, are important driers.

Resins obtained by direct recovery are also important in the paint industry. Phenol, which may come from benzene or the cumene process, is important for resin manufacture. Phenol is also the basis for bisphenol A which, with epichlorohydrin, provides the epoxy resins. Phthalic anhydride, which comes from o-xylene, is important for resins, plasticizers and also for certain dyes and toners. Styrene, which is benzene-based, is important in resins. Toluene and the xylenes, which are obtained by direct recovery, are important solvents. o-Xylene, as already indicated, is the basis for phthalic anhydride. Urea, a chemical based on methane, is important for resin formation as are vinyl acetate and vinyl chloride which come from acetaldehyde and ethylene or methane respectively.

The above chemicals have a varying dependence on the surface coatings industry. Thus, there are some which find their markets primarily as raw materials for the protective coatings industry. These include bisphenol A and epichlorohydrin which are, of course, the major components of the epoxy resins. Also included in this category are ketones higher than acetone which are useful as solvents for lacquers and for some of the newer protective coating vehicles, such as the vinyls and epoxies. The final group of materials whose markets are primarily in the protective coatings industry are those which provide the building blocks for alkyds—glycerol, pentaerythritol, maleic anhydride, and phthalic anhydride.

Among the compounds which are widely but not exclusively used by the protective coatings industry are acetone, n-butanol, formaldehyde, naphthenic acids, vinyl acetate and the xylenes.

In the third category are those materials which enjoy even a lesser share of protective coatings outlets. These include acetaldehyde, ethyl alcohol, isopropyl alcohol, phenol, styrene, toluene, urea, and vinyl chloride.

Methane

Methyl alcohol
Synthesis gas
Formaldehyde
Methyl amines (mono, di- and tri-)
Methyl chloride
Hexamethylene tetramine
Pentaerythritol
Formic acid
Dimethyl sulfate
Methyl ether
β-propiolactone
Ethylene glycol
Acetylene
Methylene dichloride
Chloroform
Carbon tetrachloride
Dichlorodifluoromethane
Dichloromonofluoromethane
Carbon black
Ammonia
Hydrogen cyanide
Hydrazine
Acrylonitrile
Methyl mercaptan
Carbon disulfide

Ethane, Propanes Butanes and Pentanes

Ethylene
Ethyl chloride
1,3-Dichloropropane
Nitroparaffins
Butylenes
Butadiene
Thiophene
Amyl chlorides
Amyl alcohols
Amyl mercaptans
Amylphenols
Amylamines

Ethylene

Ethyl alcohol
Ethyl ether
Acetaldehyde
Acetic acid
Acetic anhydride
Butyraldehyde
Butyl alcohol
Butyric acid
Butyl amines (mono, di- and tri-)
2-Ethyl-1-butanol
1-Hexanol
2-Ethylhexyl aldehyde
2-Ethyl-1-hexanol
2-Ethylhexanoic acid
2-Ethyl-1,3-hexanediol
Ethyl chloride
Tetraethyl lead
Ethylbenzene
Styrene
Ethylene dichloride
Ethylenediamine
Vinyl chloride
1,1,2-Trichloroethane
Vinylidine chloride
Ethylene dibromide
Ethyltoluenes
Vinyltoluenes
Ethylene chlorohydrin
Ethylene oxide
Ethylene glycol
Ethylene glycol monoethyl ether
Polyethylene glycols
Dichloroethyl ether
Thiodiglycol
Dichlorodiethyl sulfide
Glyoxal
Dioxane
Dioxolane
Ethanolamine
Diethanolamine
Triethanolamine
Morpholine
Ethylene imine
Ethylene cyanohydrin
Acrylic acid

Propylene

Isopropyl alcohol
Isopropyl ether
Isopropyl amines (mono and di-)
Acetone
Diacetone alcohol
Mesityl oxide
Methyl isobutyl ketone
4-Methyl-2-pentanol
Diisobutyl ketone
Diisobutylcarbinol
Isophorone
Ketene
Acetic anhydride
Acetoacetic acid
Isopropenyl acetate
2,5-Dimethylfurane
Acetonylacetone
Acetone cyanohydrin
Methacrylic acid
2-Methyl-2,4-pentanediol
Methylpentadiene
Cumene (isopropylbenzene)
Cumene hydroperoxide
Phenol
β-Methylstyrene
Propylene chlorohydrin
Propylene oxide
Propylene glycol
Polypropylene glycols
Polypropylene glycol ethers
Propionaldehyde
Propionic acid
Propyl alcohol
Pyruvaldehyde
Isopropyl amines (mono, di- and tri-)
Allyl chloride
Allyl alcohol
Glycerol dichlorohydrins
Epichlorohydrin
Glycerol
Dichloropropylenes
Acrolein
Tripropylene
Tetrapropylene
Nonylphenols
Dodecylbenzene
Propylene dichloride
1,2-Propylenediamine
Butyraldehyde

n-Butylenes

Secondary butyl alcohol
Methyl ethyl ketone
Butadiene
Ethyl butyl ketone

Isobutylene

Tertiary butyl alcohol
Polybutylenes
Butyl rubber
Diisobutylene
Nonyl alcohols
Isooctane
Methallyl chloride
Tertiary butyl phenol
Triisobutylene
Tertiary octyl phenol
Tertiary octylphenoxy polyethylene glycols
Secondary amyl alcohol
Methyl n-propyl ketone
Octyl alcohols

Acetylene

Vinylacetylene
Chloroprene
Cyclooctatetraene
Acetaldehyde
Vinyl chloride
1,1,2-Trichloroethane
Vinylidine chloride
Tetrachloroethane
Ethylene dichloride
Trichloroethylene
Tetrachloroethylene
Vinyl acetate
Methyl vinyl ether
Butynediol
Butanediol
Tetrahydrofuran
Butadiene
N-Vinylpyrrolidone

Naphthenes

Benzene
Toluene
Xylene
Cyclopentene
Adipic acid
Hexamethylene diamine

Aromatics

Benzyl chloride
Benzaldehyde
Benzoic acid
Trinitrotoluene
Toluenesulfonamide
Toluenesulfonic acids
Phthalic anhydride
Terephthalic acid
Isophthalic acid
Carbon black

Wax

Chlorinated wax
Straight chain olefins
Fatty acids and esters

Butadiene

Hexamethylene diamine
4-Vinylcyclohexene

Table II — Chemicals Obtained from Petrochemical Raw Materials

Dow Latex 566 opens a new era in industrial metal finishing

Latex X-2566 loses its X-2 to become the first latex for new and unique baked industrial finishes

Yes, the X-2 experimental designation has been dropped from Dow Latex X-2566. But something's been added to Dow Latex 566—added production to take care (we hope) of the rocketing demand for this remarkable new latex.

Actually, few of the people who put Dow Latex 566 to the test in customer field trials used the word "remarkable". Dow, they knew, pioneered latexes for latex paints. The first interior flat wall paints of latex that *worked* were made using Dow Latex. And Dow, they knew, supplies most of the latex in paints today. They just seemed to expect that the first latex designed for baked industrial finishes on metal would fly the same banner as the rest of the winners.

Nevertheless, Dow Latex 566 is quite remarkable

Dow Latex 566 is a colloidal dispersion of styrene/butadiene particles in a water system. At last! Here's an industrial finish which is *not* a solution, but a water-dispersed system of latex particles which can have as high a molecular weight as desired without affecting the viscosity of the paint. You see, the molecular weight can be built right into the resin without any concern over its solubility. Here's a water-system industrial finish that practically eliminates fire hazards . . . *completely* eliminates danger from objectionable solvent fumes. And formulators can make a high solids content paint with tough, high-molecular weight copolymer particles.

Speaking of film properties, listen to this: Heat and unique methods of catalysis, by taking advantage of the reactive butadiene groups in the polymer, promote a thermosetting phenomenon with a remarkable upgrading of film properties. Yes, remarkable. You get an exceptionally tough film, good adhesion and durability; one that resists water, chemicals and mineral spirits. And, underfilm rusting is not a problem!

Something wonderful happens when Latex 566 meets iron ions

Back when Latex 566 was new, even to us, some of our men proposed staunchly that the catalysis of a styrene/butadiene copolymer latex could be accomplished on steel through the effect of iron ions at an acid pH. And sure enough, they went ahead and proved it. The iron present is an effective catalyst for double-bond cross-linking at usual baking temperatures. We'll be glad to tell you about the other methods of catalysis that have been developed, but we're especially taken by this one.

Latex 566 shines for automotive and white appliance primers

Applications for metal primers are legion. But the starting point formulations we've tested for automotive and white appliance primers will give you an idea of the wide range of Latex 566 versatility.

For example, in an iron oxide type primer and in an iron oxide/zinc yellow system, we found Latex 566 primers had the following admirable characteristics:

1. *Excellent sprayability*
2. *Excellent adhesion and sandabilit*
3. *Good enamel hold-out*
4. *Minimum 340 hours salt spray resistance of both primer/enamel and primer system*
5. *Comparable impact resistance to a commercial alkyd-type primer*

The white appliance primer formulation sprayed easily and took a superb white appliance baking enamel after a short flash bake at 140°F. for 10 minutes.

After the enamel bake, the primer came through with:

1. *Excellent adhesion*
2. *Excellent enamel hold-out*
3. *Minimum 1000 hours at 100°F. and 100% relative humidity for both latex primer and latex primer/enamel system*

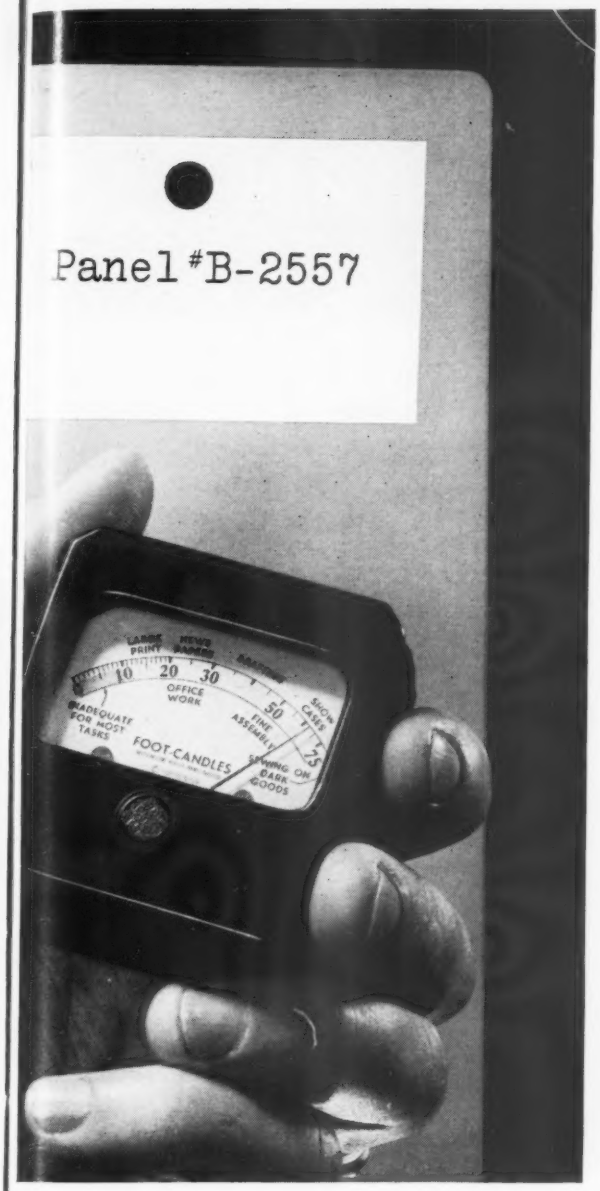
More good news . . . Latex 566 for gloss and semi-gloss bake enamels

Gloss and semi-gloss bake enamels can also be formulated with Dow Latex 566. You'll want to know more about important factors in these formulations . . . such as degree of pigment dispersion and latex-to-pigment ratios.

In fact, why not get all the facts that *we* have about this revolutionary new industrial latex? We think you'll find that Dow Latex 566 can change your whole outlook on the formulation and use of baked industrial finishes. Write to us and ask for the bulletin on Dow Latex 566 (or X-2566 if you still remember it by that name). THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales Dept. 2120J.

LATEX T.M.

YOU CAN DEPEND ON DOW



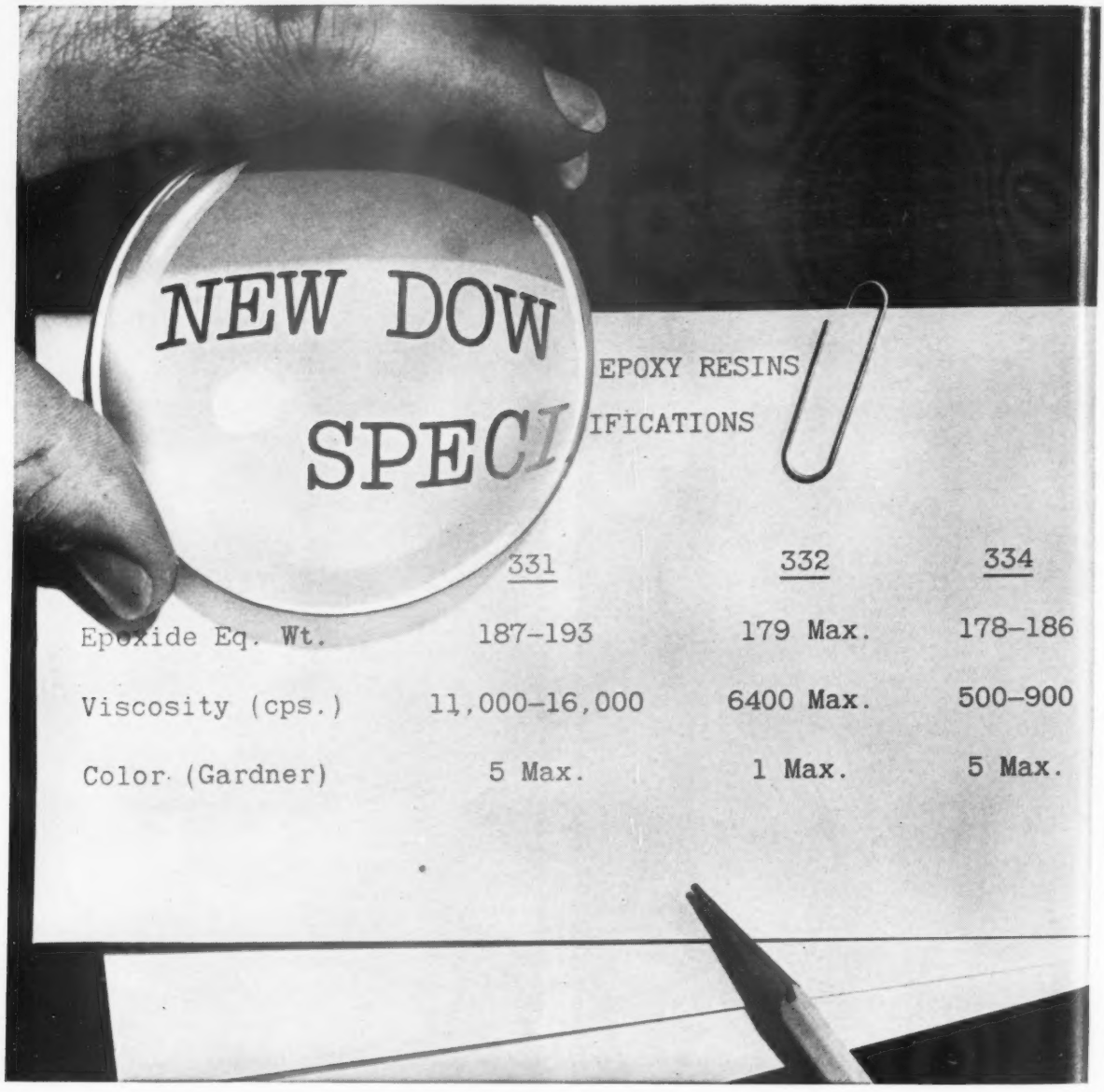
Dow vinyltoluene delivers low color, high gloss, snap dry with any drying oil

No doubt the most significant advantage of Dow vinyltoluene is its ready ability to modify all commercially important drying oils. With any of them—whether dehydrated castor, linseed, safflower, soya, menhaden, cottonseed, coconut or tall oil—Dow vinyltoluene consistently forms useful, sparkling-clear, high-grade and inexpensive vehicles.

This results in a wide choice of excellent vehicles to upgrade your paints and varnishes at less cost. The vehicles provide an unusual balance of properties, combining low color, high gloss and quick drying with better chemical resistance and durability.

For more information on Dow vinyltoluene, contact our nearest sales office. Or write THE DOW CHEMICAL COMPANY, Midland, Michigan, Coatings Sales Dept. 2204B.

YOU CAN DEPEND ON DOW



New Dow epoxies feature "lens clear" liquid resin

Dramatic evidence of the striking clarity and purity of Dow Epoxy Resin 332—unique member of Dow's new line of liquid epoxy resins—is shown in the illustration above. The magnifying lens was actually cast from this new water-clear resin. In addition to improved clarity and uniformity, DER 332 has very low viscosity, longer pot life and greater heat resistance than conventional epoxies.

Also available, for formulations where absolute purity is not so important, are Dow Liquid Epoxy Resins 331 and 334.

Dow's position as a basic producer of all epoxy raw materials assures top quality control and a narrower range of specifications. It will also enable Dow to introduce, in the near future, a complete line of solid epoxy resins and a new line of polyfunctional liquid epoxy resins outstanding in high temperature service.

Prompt delivery of these three Dow Liquid Epoxy Resins can be made in drums, truck or tank car lots. For more information contact your nearest Dow sales office or write THE DOW CHEMICAL COMPANY, Midland, Michigan, Coatings Sales Dept. 2259K.

EPOXY

YOU CAN DEPEND ON DOW

ELECTRICAL CHARGE of PIGMENTS in VEHICLES

AN ESSENTIAL problem in in pigment application is the interaction between the pigment particles and their surrounding medium.

Despite the importance, little is known about this topic. In the last few years, several papers dealt with the charge of pigments in macromolecular solutions. Discussion was restricted to electrophoretic measurements without relating the results to paint properties.

This paper correlates the charge of inorganic and organic pigments in several different binders, each system dissolved in solvents of different polarity. In addition, the influence of surfactants and coalescing agents is treated. The relation between the electrical charge of the pigment particles and the stability of these suspensions will be described and related to practical technical properties such as degree of dispersion, gloss, hiding, easy brushing, leveling and optimum pigment volume.

Methods and Apparatus

In order to observe the behaviour of pigment particles in an electrical field, a typical electrophoretic apparatus was used. Details may be found in the original paper or references included therein.

Electrophoresis of Pigments

The following inorganic pigments of German manufacture) were used in this study.

Rutile titanium dioxide
Anatase titanium dioxide
Zinc white
Red lead
Lead cyanamide
Chrome yellow
Chrome oxide green
Yellow iron oxide
Red iron oxide
Black iron oxide
Milori blue

The selection of solvents was difficult. Since the objective of this investigation was to study the interaction of the greatest possible number of binders (varying in polarity) with the pigment particles, the fact that polar molecules dissolve best in polar solvents and non-polar molecules best in non-polar solvents produced problems. The solvents chosen were benzene, (Dielectric Constant (DC) = 2.24.), chlorobenzene (DC = 5.61), and butyl acetate (DC = 5.01). This provided a relatively large range of solvents capable of dissolving many polymers.

The binders were characterized as follows:

1) macromolecular substances soluble in benzene, chlorobenzene, and butyl acetate.
2) Polar and non-polar macromolecular substances.
3) Macromolecular substances of high and low acidities.

In Table I are listed commercial binders (of German origin) which fulfilled the above requirements with the exception of nitrocellulose. The highly polar nitrocellulose was examined only in butyl acetate.

Table 1

Binder	*Acid Number*
Polystyrene	0
Chlorinated rubber	0
Acrylic resin	0
Ethyl cellulose	0
Nitrocellulose	0
Linseed oil	1
Stand oil	6
Epoxy resin	1-2
Polyester A	1-2
Polyester B	1-2
Castor oil	2

This feature is based on article by G. Florus and K. Hamann which appeared in *Farbe und Lack*, Vol. 62, Nos. 6 and 7.

Blown linseed oil	4
Alkyd resin	10-20
Modified phenolic resin	20
Maleic resin	20-25
Alkyl phenolic resin	50-60

Since inorganic pigments do not show electrophoresis in non-polar solvents like benzene, it may be assumed that the electrical behaviour of pigments in benzene solutions of macromolecular substances depends on the interactions between macromolecules and pigments.

Once this interaction is known, the influence of the solvents on the electrical charge of the pigment particles can be studied.

With reference to pigment volume concentration it was qualitatively found that the ratio between pigment and binder, whether 1:50, 1:10, or 1:1 is of no influence. Therefore, a low pigment concentration was used and the ratio of solvent and binder was varied to obtain the uniform desired viscosity.

The results (in six tables) show that in general the inorganic pigments behave similarly if suspended in the same medium. Depending on the nature of the binder, the pigments are charged positively, negatively, or have no electrical charge. Borderline cases indicate that some pigments have a very small charge.

Solutions in Benzene

In the benzene solution of polystyrene, the pigments are neutral. The pigments are charged positively (move towards the anode) by high acid number binders and negatively by low acid number. binders. The observed negative charge of the pigments in the weakly acid and neutral binders may be explained by a dipole adsorbition mechanism. Chrome yellow may be distinguished from other pigments in that it shows no electrophoresis in linseed oil and epoxy resin. Benzene solutions of linseed oil result in rutile being more negatively charged than anatase. In a benzene solution of polyester, the pigments oscillate with a slight inclination towards settling on the anode. No charge exists with chlorinated rubber in benzene. In the benzene solutions of alkyd resin, modified phenolic resin, alkyl phenolic resin and maleic resin, all the pigments are positively charged. These resins are characterized by acid groups, which apparently are directed towards the polar pigment surfaces. These surfaces are able to absorb protons, thereby causing the positive charge. Zinc white and lead cyanamide move towards the anode when dispersed in benzene solutions of castor oil and acrylic resins, whereas the other pigments move towards the cathode. In ethylcellulose, all the pigments have a tendency to move towards the cathode.

Solutions in Chlorobenzene

By comparing solutions in chlorobenzene with solutions in benzene, the influence of the chlorobenzene can be determined.

Zinc white, red lead, chrome oxide green, and the iron oxides are negatively charged in chlorobenzene. In the chlorobenzene solution of acrylic resin, most pigments show no electrophoresis. However, zinc white is negatively charged whereas rutile titanium dioxide is positively charged. In the combinations of chlorobenzene with polystyrene, epoxy resin, and castor oil, the pigments are charged differently from similar solutions in benzene. This proves that the electrical charge of the pigments is not induced exclusively by the binder.

Solutions in Butyl Acetate

In butyl acetate alone and in polystyrene-buty lacetate solution, the pigments move towards the anode, but the sediments do not adhere tenaciously to the electrode. The difference between the benzene system and the butyl acetate system is only gradual.

The butyl acetate solution of castor oil shows that in this particular case the influence of the solvent is greater than the influence of the binder.

The results, described in this paper, are independent of the method of dispersion. Similar results were obtained regardless whether the dispersion was obtained by mulling on glass or on metal, grinding in a funnel mill, or in ball mills with porcelain balls or with steel balls.

The simultaneous formation of sediment on both electrodes was not observed. That such phenomena were mentioned by other investigators might have been due to induction currents.

Thus inorganic pigments can be electrically charged. The electrical charge depends on the polarity of the binder and of the solvent and is caused by the adsorption of ions or dipoles. If the binder is non-polar, the influence of the solvent is most pronounced. As the polarity of the binder increases the interaction between pigment and binder also increases.

Electrophoresis of Organic Pigments

Previous articles show that organic pigments in non-polar organic solvents are electrically charged in contradistinction with inorganic pigments which are not charged. The organic pigments studied were toluidine yellow, phthalocyanine green, phthalocyanine blue, litholrubin red, helio red, and chrome naphthol red (German type). The experiments described, show that the organic pigments may be divided into two groups, those which are negatively charged and those which are positively charged, each independent of the medium in which they are suspended. Toluidine yellow and phthalocyanine green belong to the negatively charged pigments, while phthalocyanine blue, litholrubin red and chrome naphthol red are positively charged. The charge is pronounced in all cases, with the exception of those dispersed in ethyl cellulose. This is probably due to the fact that ethyl cellulose does not dissolve but swells in benzene and butyl acetate. It was observed that the experiments with organic pigments are in agreement with the results of others in that neither the solvent nor the binder influences the electrical charge of organic pigments.

Influence of Wetting Agents

Reports are that electrophoresis of pigments in organic solvents showed a change in electrical charge upon addition of wetting agents. Some suggest that the hydrophilic part of an ionic surfactant is directed towards the surface of the pigment particle, while the hydrophobic part is oriented towards

the organic phase. The degree of charge is determined by the absorbed hydrophilic ions.

In measuring the conductivity of ionic and non-ionic surfactants in xylene, one author showed that the ionic surfactants produced highly charged and stable suspensions. The non-ionic surfactants do not influence the charge of the pigments. The dispersing action was attributed to absorbtion of the surfactant which thereby prevented the particles from coming close together.

A series of experiments were performed with three wetting agents; the sodium salt of napthalene sulfonic acid, a fatty alcohol sulfonate and a fatty surfactant. For inorganic pigments 1% (by weight) of wetting agent was added, and for organic pigments 10%. The results show that the inorganic pigments are strongly influenced by the altered electrical charge. The anionic surfactants have no influence however on the organic pigments, since not even 10% addition is able to change the specific charge. Of interest is the fact that red lead does not change its charge in linseed oil and stand oil on addition of the sodium salt of alkyl napthalene sulfonic acid, whereas it does in systems of other binders. It is assumed that in linseed oil and stand oil, the surfactant is not absorbed by the pigment since the linseed oil and stand oil are already well absorbed. In the case of inorganic pigments, the absorption of cations causes changes in the zeta-potential. The small metal ions seem to be absorbed at the surface of the pigment particles while the big organic anions remain partially in the organic phase.

The critical amount of surfactant, i.e. the smallest amount necessary for a change in polarity was investigated with a red iron oxide paint. If dispersed in a ball mill with steel balls, the addition of 0.001% of surfactant still may determine the charge of the pigment. If dispersed in a ball mill with porcelain balls, the critical amount was 0.01%.

The critical amount depends on the dispersion method and must be determined in each case.

Stability and Electrical Charge

Stable and unstable suspensions may be distinguished by their form of settling. Unstable suspensions settle quickly and form loose agglomerates. Stable suspensions settle very slowly and in a very firm form.

Colloid chemical stability influences the degree of sedimentation during electrophoresis. Only stable suspensions produce dense sediments. The repulsive forces cause concentration of the charged particles around the electrodes. The electrodes are surrounded by a zone which finally becomes so concentrated that a dense layer settles on the electrode. Similar phenomena might occur at settling. A dense settlement requires a favourable packing of the particles which is possible if the electrical double layer prevents easy agglomeration, thereby permitting orientation to take place.

To establish the relation between charge of pigments and paint stability, electrophoresis and stability tests were performed with rutile TiO_2 in solutions of polystyrene. The electrical charge in chlorinated rubber and acrylic resin are not pronounced, but in stand oil it is highly negative. The pigment settling was very loose in polystyrene, flaky in chlorinated rubber and acrylic resin and dense in stand oil.

The influence of mechanical protection by a solvation layer around the pigments was tested with ionic and non-ionic wetting agents. Non-ionizing formulations which differed only in pigment wetting agents showed that the formulations without wetting agents showed no electrophoresis and a voluminous sediment. The formulations with non-ionic wetting agents showed a settling of medium size volume. The cationic wetting agents showed the densest settling and strongly cathodic action. All tests with complete paints show that electrophoretic sedimentation always means that the settling in the paint will be dense, while no electrophoretic sedimentation always means that the settled pigments are voluminous and easy to redisperse.

Flow Characteristics

The flow characteristics can be expressed by dynamic viscosity which can be increased by mutual hindrance of the pigment particles in the paint. The minimum value of the shear force necessary to obtain flow is called the yield value. A low yield value indicates a good flow and little agglomeration of the pigment particles. The adhesion between the agglomerated pigment particles is low if the flow in the paint increases rapidly with increasing shear force, that is, once the shear force has surpassed the yield value. If the flow remains low with increasing shear, the agglomerated particles are too adherent. It is assumed that the pigment particles are less hindered if the stabilizing forces in the paint are stronger.

The flow characteristics, stability, and electrophoretic behaviour are related properties. Formulations in which the pigment particles show an electrostatic charge show increasing flow with increasing shear. The formulations in which the pigment particles have no charge are characterized by little increase of flow with increasing shear.

Effect on Application

Optimum Pigment Absorption

Increasing pigment volume causes increasing yield value and increased plastic viscosity. Comparison of the flow characteristics of different media for rutile titanium dioxide shows that the formulations with alkyd resins show a higher optimum pigment volume than with polystyrene. The polar carboxyl groups interact with the pigment particles and induce an electrical charge on the pigment particles. This improves the pigment particles and its stability. The pigment particles dispersed in polystyrene—toluene show no electrical charge. In consequence the pigment in this medium is not well dispersed and shows a lower optimum pigment volume.

Leveling

In order to avoid brushmarks and retain gloss in spite of a high pigment volume, benzoic acid, crotonic acid, and furanoic acid have

(*Turn to page 91*)

Du Pont

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NEW CODES FOR RUTILE

Here are important savings in new profit op

- All-purpose pigment for trade sales paints—especially emulsions
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BETTER THINGS FOR BETTER LIVING ... *THROUGH CHEMISTRY*

PIGMENTS DEPARTMENT

The author continues his random reflections on various aspects of the paint industry. The opinions expressed in this column are his alone and do not necessarily reflect those of this publication.

Radiation Protection

DESPITE their rapid growth and exciting progress, the atomic energy industries have not yet made an impact on the paint industry, and probably will not for a long time. Eventually, of course, this situation will change. The tremendous effort to protect living beings and equipment against harmful radiation is one area that may yield surprising by-products pertinent to paint.

Since all kinds of radiation—i.e., radiowaves, ultraviolet light, x-rays, or gamma rays—are fundamentally the same, the observation of M. Burton and S. Lipsky [*J. Phys. Chem.* 61, 1461 (1957)] that the addition of small amounts of certain substances to organic systems markedly reduced yields of radiolysis products is one worthy of closer analysis. The title of the paper is self explanatory—*Mechanisms of Protection in Radiolysis of Organic Systems.* Of local interest is that although the authors are concerned with ionizing radiations such as beta and gamma rays, the findings may be extrapolated to the less energetic longer wave length radiations, such as ultraviolet light and to organic systems such as paint films.

Phil Heiberger

Radiolysis is simply the destruction of a molecule in the path of a gamma or x-ray or a high speed nuclear particle. In essence, the harmful consequence of radiation is due to ionizing effects, that is, the ability to eject orbital electrons from atoms present in the various compounds in the path of the radiation. Although radiations can produce desirable effects such as initiate polymerizations and other free radical reactions, reactions, the real interest for studying radiolytic reactions is to learn how to prevent radiation damage and thus avoid destruction of equipment and life.

By protection, the authors recognize a variety of meanings depending on the viewpoint of the observor as well as the details of the process under investigation. For example, if a reaction M = R + X yields two radicals either of which can react with a second species N, and thus modify or destroy it, an active agent may be added with the objective of intercepting or scavenging the radicals before they can enter into the reaction with N. In this case, N is protected from chemical reaction but M is not protected from decomposition. In the Burton & Lipsky paper, the concern is with true protection of M, not with the scavenging of the products of its decomposition. Real protection is thus an effect on the precursors of all subsequent chemistry, i.e., on excited and ionized states of the compound primarily affected by the radiation. In any case, in study it is frequently difficult to distinguish between real protection and scavenger action.

These studies include the protection of cyclohexane by benzene, the effect of various additives, such as iodine, on the radiolysis of cyclohexane and benzene mix-

tures, etc. Other studies are also in progress and at this time indirect evidence is beginning to accumulate that points to an an effect of real protection.

Obviously, it is too soon to extrapolate these data to protecting polymers against weak solar radiations, but it is well to be aware that such studies are in progress. Some day, no doubt, and unexpected bonus will be found. To go into details here would be inadvisable, but a brief outline of the protective mechanisms may be of interest.

Several mechanisms can be invoked to explain this "protective" effect. These can be classified into two broad types: First, a scavenger effect of the additives on free radicals produced from primarily excited and ionized solvent molecules. Second, an effect of additives is assumed to provide an alternative path of energy dissipation, e.g., by inducing internal conversion in the excited solvent, by excitation transfer or by negative-ion formation. Benzene may act as a scavenger, but it appears also to exercise a strong protective effect via some form of this second mechanism. In general, part of the effect of typical radical scavengers may also involve the second mechanism.

Some Aspects of Adhesion

Adhesion, to a paint man, is a pretty important subject. Unfortunately, despite the tremendous amount of written material devoted to it, adhesion is more advanced as an art than it is as a science. An article entitled "The Physical and Chemical Aspects of Adhesion" (TAPPI *40*, 182A (1957) by S. Orchon) is valuable because it provides a general background designed to help bring some of the experimental detail closer to scientific understanding.

Some of this article is on the philosophical side. Orchon compares empirical and exact science as follows:

"It seems as though there are two roads—a wide open highway of trial and error, and parallel, a dark jungle road of science. A highway of no speed limitations, no red lights, hot rods having their own secrets and skills; and a bushy unknown path ridden by careful conscientious driver-scientists investigating each and every turn and decision. The aim of the scientist is to bring these two parallel roads together. Being parallel, these two roads have to meet in infinity. It means a very hard task, which probably never will be completely fulfilled."

Somehow I can't agree with this analogy. If the wide open highway were so smooth, there would be no desire or need to traverse the jungle path. It would be more accurate to say that the highway, although equipped with occasional happy speed zones, was also studded with frequent unpredictable detours, as well as innumerable unexpected dead ends.

Orchon has this to say about the relationship between friction and adhesion:

"As an odd example of a close contact between bodies, the relationship between a newcomer to this field—friction—and adhesion may be mentioned at this point. It has been proven that friction is due to strong adhesion at points of contact. This mechanism applies not only to metals, where local "cold welding" occurs at the points of real contact, but it also applies to non-metals, plastics, polymers, etc. The adhesion is usually so strong that shearing occurs in bulk at the surfaces rather than at the interface. It has been proven that a high frictional force is associated with high adhesion between surfaces, friction being the shear strength and adhesion the tensile strength of the junctions formed between sliding surfaces."

Orchon on the significance of solvents:

"At this point, it is worthwhile to mention the significance of solvents used for an adhesive. As it was proven by the author, the adhesive properties of an adhesive can be completely lost, diminished, or substantially improved by the proper selection of a solvent and/or a diluent. Any modification of an adhesive should be carefully considered under these circumstances."

Cross Fertilization

THE phenomena of superconductivity, antiferromagnetism, corrosion, and adhesion may seem to have little in common, but here again apparently widely diversified subjects may prove to be inextricably related. When certain metals are cooled to a few degrees above absolute zero, they lose all electrical resistance. It is now known that the only substances which become superconducting are elements or compounds with an average of between two and eight valence electrons per atom. And within this range the materials with an odd number of valence lectrons per atom—three, five, or seven — become superconducting most easily.

Until recently it was believed that all magnetic materials become more magnetic as the temperature drops. A new phenomenon — antiferromagnetism — a property of magnetic metals, may reverse the classical concept of transition metal electronic structure. Ford Motor Company's researchers Anthony Arrott and Hiroshi Sato (as reported in the December 2, 1957 *Chemical and Engineering News*) stated that in cooling an aluminum:iron alloy to 3° K., a paradoxical decrease in magnetic properties occurred. Since aluminum:iron alloys are non-corrosive, rusting and magnetism may be related, they say.

In a very interesting article entitled "Superconductivity" (*Scientific American*, November 1957), B. T. Matthias states that the rare element technetium, found only as a product of uranium fission in atomic reactors, has seven valence electrons and a crystal structure favorable for superconductivity. And in fact, technetium is a superior superconductor. You may also recall that technetium was mentioned in this column about a year ago (January 1957, to be exact). It was reported that potassium pertechnicate added to a corrosive solution in the proportion of 1 part of pertechnicate to 200,000 parts of solution will prevent corrosion even at temperatures above 400°F. Reports are that salts of technetium inhibit the corrosion of mild steel for two or three year periods.

One by one the pieces of a fascinating jig-saw puzzle are turning up. We now need a superdetective and a superscientist to put these pieces together in a meaningful design. The end result may well be corrosion-resisting alloys or alloys possessing unusual adhesion to coating systems.

How can they make such quick-drying paints?

Lytron* 680 *films are water-*

Compliments on the performance of Lytron 680-based paints are comin in from all over the country. These paints have been applied on brick, stucco, concrete block, cement shingles and previously painted wood surfaces such as sash, pine and cedar clapboard, and cedar shingles. And, th results have been excellent.

Lytron 680, a chemically unique acrylic-type polymer binder, can produce smooth films without modification even below 40° F. The paints flow smoothly, are easy to apply. They won't rupture on porous substrate There's no color mottling or spotting. Blistering even over green masonry is minimized. Clean-up is simple with soap and water.

I understand
they're based
on Lytron 680 Latex*

resistant in 30 minutes or less!

NOTE: *Lytron 680 can be blended with other latex systems (i.e., styrene-butadiene, alkyds) to manufacture paints with the best properties of Lytron 680 and other latices at a reasonable cost. Lytron 680 contributes early scrub and water resistance and permits earlier recoating.

Lytron 680 is available for immediate shipment in tank-car quantities. For evaluation samples, and technical data, write Monsanto Chemical Company, Surface Coating Resins Dept., Springfield 2, Mass.

Other Monsanto products for the surface coating industry include Amino Resins, Phenolic Resins, and Styrene Latices and Resins.

Monsanto

*LYTRON: REG. U.S. PAT. OFF.

NEWS

ACS Paint Division To Meet in S. Francisco

The American Chemical Society has announced the schedule for its 133rd national meeting to be held in San Francisco.

General information and facilities for registering will be available in the Civic Center Exhibit Hall and the Mark Hopkins and Sheraton-Palace Hotels.

The division of paint, plastics and printing ink chemistry will hold all of its symposiums in the Terrace Room of the Fairmont Hotel, except for Monday afternoon's symposium which is scheduled for the Corinthian Room of the Whitcomb Hotel.

The schedule for the division of paint, plastics and printing ink chemistry follows:

MONDAY, APRIL 14
Behavior of High Polymers

2:00 P.M. F. R. Eirich, *Introductory Remarks.*

2:15 R. S. Stein, J. J. Keane, F. H. Norris, F. A. Bettelheim, A. Plaza. *Optical Studies of Crystalline Superstructure in Polymers.*

2:45 L. E. Nielsen. *The Apparent Domain Structure of Polystyrene as Revealed by Liquid and Vapor Crazing.*

3:15 W. P. Cox. *Effect of Branching on Entanglements in Molten Polyethylene.*

3:45 G. L. Brown, B. S. Garrett. *Latex Thickening — Interactions in Aqueous Dispersions-Solution Combinations.*

4:15 C. M. Conrad. *Mechanical Behavior of Cyanoethylated Cotton Textiles.*

TUESDAY, APRIL 15
Symposium on Physical Properties

9:00 A.M. L. Reed Brantley. Division Chairman. *Introductory Remarks.*

9:05 Theodore F. Bradley. Symposium Chairman. *Comments.*

9:10 H. Dannenberg, J. W. Forbes, A. C. Jones. *Infra-red Spectroscopy of Surface Coatings in Reflected Light.*

9:40 Max Kronstein. *Applications of the Infrared Reflection Spectrum and of Emission Spectroscopy to the Study of Organic Coatings.*

10:10 Wouter Bosch, Arthur N. Leadbetter, Robert M. Tofte. *Outdoor and Weather-ometer Exposure of Free Paint Films.*

10:40 Thomas F. Mika. *Free Film Properties of Epoxide Resin Coating Systems.*

11:10 H. van Hoorn, P. Bruin. *Determination of the Modulus of Elasticity in the Study of Paint Films.*

11:40 J. A. Spangler, S. E. Susman, F. J. Riel. *Elevated Temperature Studies on Phenolic Films with a Vibrating Reed Elastometer.*

2:20 P.M. John Delmonte. *Physical and Chemical Characteristics of Fiberglass Reinforced Epoxy Coatings.*

2:40 Valeria Artel. *Effect of Solvents on Film Formation During Drying of Resins Solutions.*

3:05 D. Liff, Herbert W. Rudd, L. A. Tysall. *A Reassessment of the Concept of Latent Solvency in Lacquer Formulation.*

3:25 E. V. Plock. *Accelerated Testing of Plastisol Inside Finish for Mechanical Dishwashers.*

3:50 Ray Hawkins, H. L. Wampner. *Evaluating Brushability.*

4:15 Ralph E. Dunbar, Roland J. Peffer. *Permeability and Absorption Studies of Epoxy Films.*

WEDNESDAY, APRIL 16
Adhesives and Plastic Laminates

9:00 A.M. L. Reed Brantley. Division Chairman. *Introductory Remarks.*

9:05 Daniel W. Elam. Symposium Chairman. *Comments.*

9:10 Daniel W. Elam, Edna Elizabeth Elam. *The Development of Adhesive Bonding in Aircraft.*

9:35 Edmund Thelen. *Adhesive Bonding of Metals.*

10:00 Frank J. Riel, S. E. Susman, Richard Brewer. *A Simplified Theory Explaining Corrosion Resistance of Adhesive Bonded Aluminum Panels.*

10:30 Frederick J. McGarry. *Resin Characteristics Relating to Laminate Behavior.*

11:00 J. J. Bikerman. *Some Applications of the Theory of Adhesive Joints.*

11:30 John H. Geyer. *Chemical Preparation of Metal Surfaces for Adhesive Bonding (By title).*

General

2:00 P.M. L. Reed Brantley. *Introductory Remarks.*

2:10 N. G. Long, S. E. Church, V. Stannett. *The Beater Addition of Phenol Formaldehyde Resins .*

2:30 W. T. Heyse, V. Stannett. *Latex-Treated Papers.*

2:50 K. N. Edwards, L. J. Nowacki, E. R. Mueller. *Acetylinic Alcohol Inhibited Pickling Bath as a Pretreatment Prior to Lining Steel Pipe.*

3:10 H. M. Teeter, L. E. Gast, J. C. Cowan. *Vinyl Ethers of Unsaturated Fatty Alcohols: Promising New Materials for Protective Coatings.*

3:30 Leon B. Gordon, Paul D. May, Robert J. Lee. *Production of Resins by the Formic Acid Catalyzed Condensation of Aromatic Hydrocarbons with Formaldehyde.*

3:50 R. F. Carmody. *Acidolysis Method of Isophthalic Oil Modified Alkyd Resin Synthesis.*

4:10 Hugh C. Anderson. *Determining the Epoxy Content of Cured and Uncured Resins.*

4:30 Business Meeting.

5:15 Divisional Social Hour.

THURSDAY, APRIL 17
General

9:00 A.M. L. Reed Brantley. *Introductory Remarks.*

9:10 Herbert M. Ezekiel, George J. Collins. *A Multi-purpose Ink for Marking Plastic Film and Coated Fabrics.*

9:30 M. M. Epstein, C. W. Hamilton. *An Investigation of Mixed Polyamides Containing Piperazine.*

9:50 I. J. Gruntfest, L. H. Shenker. *The Behavior of Plastics at Very High Temperatures.*

10:10 Howard E. Hoyt, H. W. Keuchel, R. B. Dean. *Thermal Instability of Novolac Resins.*

10:30 P. R. Graham, J. R. Darby, B. Katlafsky. *Improved Light Stability for Plasticized Poly (vinyl Chloride).*

10:50 Kern Sears. *Plasticizer Degradation Studies-I. Preliminary Report on Latent Degradation.*

Water Thinnable Coatings

11:10 A.M. Herbert Terry. *Introductory Remarks.*

11:25 D. B. Fordyce, J. Dupré, W. Toy. *Alkali Soluble Acrylic Emulsions.*

2:00 P.M. Herbert Terry. *Introductory Remarks.*

2:05 Philip Gordon, Edward Harmon. *Radioactive Tracer Study of Copolymerization vs. Post Plasticization of Poly (vinyl Acetate) Emulsions for Paint.*

2:30 Felix P. Liberti, Raymond C. Pierrehumbert. *Determination of Critical Pigment Volume Concentration of Vinyl Emulsion Paint Systems by Pigment Water Sorption Method.*

3:00 Arnold Loebel. *The Determination of the Average Particle Size of Synthetic Lattices by Turbidity Measurements.*

3:30 B. S. Garrett, W. C. Prentiss, J. D. Scott. *Factors Affecting the Leveling of Latex Paints.*

4:00 Richard T. Ross, Stanley J. Buckman. *Microbiological Deterioration of Water-Thinnable Coatings.*

4:30 W. F. Scheufele, N. C. Tompkins. *The Formulation of Water-Thinnable Paints from Emulsifier-Free Vinyl Acetate Copolymer Dispersions.*

FRIDAY, APRIL 18

9:00 A.M. Divisional Tour to Shell Development Co. Laboratories. Complimentary tickets available at Divisional Meeting Room.

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Office Moved

The Patterson Foundry and Machine Company, a subsidiary of Ferro Corporation, has moved its New York offices to 527 Lexington Avenue, New York 17, N. Y., it has been announced.

NEWS

Color Boom Predicted for Boating This Year

A color boom in boating for 1958 is expected by the National Paint, Varnish & Lacquer Assoc., based on the trends of 1957.

According to General Joseph F. Battley, Association president, a wider range of colors was sold to boat owners and manufacturers during 1957 than ever before. The trend, he said, was to bright and pastel paints, with two-tone jobs predominating.

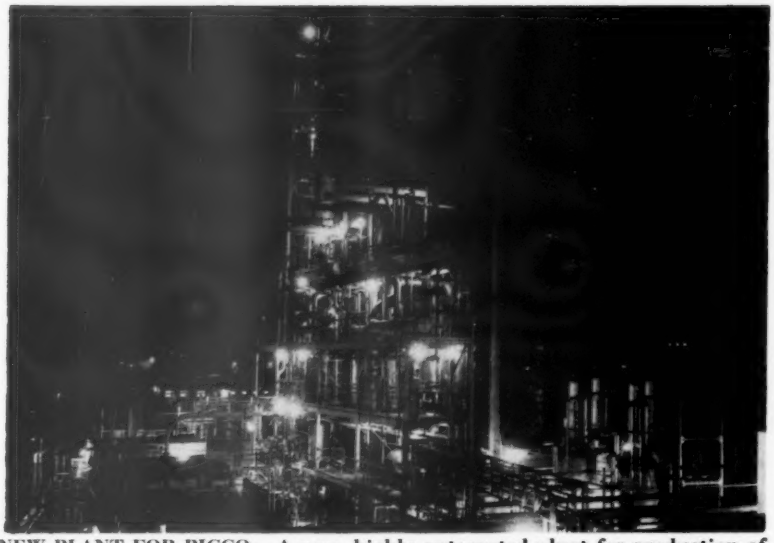
The trend toward multi-colored painting of boats differed sharply from what was in evidence in 1956, when only 40 per cent of all boats were painted in two tones, with white as one of the colors in at least 75 per cent of the two-tone jobs.

In 1957, pale greens, reds and soft and bright blues climbed sharply in popularity, according to the NPVLA report. The growing trend toward color is expected to extend in 1958, with many boats being painted in three or more colors.

Both small and large cruisers are expected to use two or more colors in cabin interiors, while contrast is also expected to prevail on cabin exteriors, decks, topsides and bottoms. Greater use of pastel shades such as pale yellows, greens, blues, corals, greys and tans, or buff shades and even pinks has been predicted.

Manufacturers of marine paints increased the number of ready-mixed paints 20 per cent in 1957, according to the report, and offered colors for mixing with marine coating to produce more than 1,000 nautical colors and shades. Even more ready-mixed colors are to be offered in 1958.

The trend toward greater use of color in boating is attributed to the growth of boating as a family participation sport. In a survey of painting habits, the NPVLA found that in more than 69 per cent of American families, the woman is responsible for color selection.



NEW PLANT FOR PICCO: A new, highly-automated plant for production of hydrocarbon resins and aromatic solvents has been placed on stream at West Elizabeth, Pa. by Pennsylvania Industrial Chemical Corp. This facility will manufacture PICCO products for paint and general compounding industries.

Gordon Research Conference Scheduled

The Gordon Research Conferences for 1958 will be held from June 9 to August 29 at Colby Junior College, New London, N.H., New Hampton School, New Hampton, N.H. and Kimball Union Academy, Meridan, N. H.

The conferences were established to stimulate research in universities, research foundations and industrial laboratories. This purpose is achieved by an informal type of meeting consisting of scheduled lectures and free discussion groups.

The purpose of the program is not to review the known fields of chemistry, but primarily to bring experts up to date as to the latest developments and to analyze the significance of these developments.

Individual rights are protected through an established rule that all information presented is not to be reproduced or used without the contributor's consent.

Individuals interested in attending a conference are requested to send their application to the Director, indicating the institution or company with which they are connected and the type of work in which they are most interested.

Requests for attendance or for any additional information should be addressed to W. George Parks, Director, Dept. of Chemistry, Dept. PVP, University of Rhode Island, Kingston, R. I. From June 9 to August 29, mail should be addressed to Colby Junior College, Dept. PVP, New London, N. H.

The schedule for the Organic Coatings Conference to be held at the New Hampton School, New Hampton, N. H. is as follows:

JULY 7

Frederick R. Eirich. *Graft and block polymers.*

John C. Cowan. *Vinyl ethers of unsaturated fatty alcohols: Promising new protective coating vehicles.*

JULY 8

Ray L. Heinrich and David A. Berry. *Monocarboxylic aromatic acids in alkyd coatings.*

J. K. Craver. *New expoy resins in surface coatings.*

D. W. Caird. *Solution and film forming properties on lexan polycarbonates.*

JULY 9

Raymond R. Meyers. *The rheology of film application by rollers.*

James H. Taylor. *Application of hydrodynamic theory to the roll mill nip.*

JULY 10

Samuel Gusman. *A study of factors affecting the adhesion to metal of certain vinyl polymers.*

Elaine Shafrin. *Factors affecting wettability of organic surfaces.*

JULY 11

H. Lacks. *Icephobic coatings.*

NEWS

Fourth Biennial Western Symposium

The Golden Gate Production Club was the host at the fourth biennial Western Symposium held on February 27 and 28 in San Francisco.

Over 1000 persons attended the formal sessions which presented outstanding technical papers pertinent to pigments, solvents and vehicles.

The technical program began on the afternoon of the first day with a talk by Garnet Grieve, sales manager, Pacific Paint and Varnish Co.

Mr. Grieve discussed the origin of the paint kit idea, the benefits to the industry that should be derived and the means whereby the kit is to be promoted.

Dr. C. E. Burleson, San Francisco State College, then spoke on the development of a paint kit for use in intermediate grade schools. The values of such a kit to the school teacher and to the student, as well as industry, were examined.

Sam Hollis of the Pennsylvania Industrial Chemical Corp. delivered a talk on modern formulations with hydrocarbon resin emulsions.

Preparations and properties of these emulsions were described. Also, the pertinent properties of petroleum hydrocarbon resins were examined briefly.

The final talk of the afternoon was given by John C. Becker, Jr., head, vinyl resins applications laboratory, Celanese Corp. of America.

Mr. Becker discussed the repainting of chalky surfaces with exterior emulsion paints. His paper described tests and data which showed that poly emulsion paints can be formulated to give excellent performance over chalky and dirty surfaces.

The program continued the following day with a talk concerning the areas of difference and similarity in the pigmentation of conventional and aqueous paint systems.

L. R. Sherman, pigment color division, Imperial Paper and Color Corp., examined the problems in pigmentation that arise from the use of aqueous vehicles in terms of conventional knowledge of pigmentation.. Areas of improvement for aqueous paints were also described.

The effect of extenders on hiding power of titanium pigments was discussed by Fred B. Steig, manager, technical service laboratories, Titanium Pigment Corp.

Mr. Steig outlined a procedure for calculating hiding power of pigment-extender blends from prim pigment data alone.

The morning session was con cluded with a talk by Joe Weber technical committee, Los Angele Paint and Varnish Production Club

Mr. Weber presented the firs report on a study of the relation o surface area of pigments to pig ment volume.

After luncheon, Valeria Arte research chemist,, California Re search Corp., discussed the "chem guage" approach to better paints.

The paper examined the fundamental equations on evaporation and other phenomena in terms of how they help to explain solvent and coating properties.

The application and recent chemistry of wash primers was reviewed by M. H. Roth and M. D. Kellert, technical service department, Shawinigan Resins Corp.

Newer developments were discussed and a formulation with improved water resistance given.

A paper describing recent developments in air-dry metal finishes based on Nitrocellulose and parlon chlorinated rubber was given.

R. P. Hirt, F. E. Piech and J. E. McCord, research center, Hercules Powder Co., presented the paper.

The technical program came to a close with a talk by Sam A. Brady, resin research, Dow Corning Corp.

Mr. Brady discussed the chemistry and properties of three silicone resin intermediates. The effect of various substituents on the ultimate properties of the modified resin was reviewed.

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H. L. Jungmann Passes

Harold L. Jungmann, Easte n sales manager of the National Le d Co.'s titanium division, died re cently after a long illness. He w s 56 years old.

Mr. Jungmann was a gradua e of the University of Illinois with a B.S. in Chemical Engineering. H e spent his entire business care r with National Lead's titanium div ision, starting in the St. Louis pla t and later transferring to the Ch cago sales office.

He moved to New York in 194 , and became Eastern district sal s manager in 1955. Mr. Jungma n was a member of the New Yo k Paint, Varnish & Lacquer Asso .

EXECUTIVE COMMITTEE of the Golden Gate Paint, Varnish and Lacquer Association for fiscal year 1957-58: (seated) B. King Haugner, vice president; G. J. Grieve, president; Kenneth J. Forshee, secretary-treasurer; (standing) Jim Fraser, Richard W. Hammond, T. M. Pennington and W. N. Crumpler, executive committeemen; and Geo. E. S. Thompson, executive secretary.

NEWS

New Polymer Developments Discussed at Symposium

At the Pacific Coast Paint and Varnish Production Clubs fourth biennial symposium, John C. Becker described new polymer chemistry developments in the use of water-thinned emulsion paints.

Mr. Becker, head of Celanese Corp. of America's Vinyl Resins Applications Laboratory, talked on how new Celanese formulations in polyvinyl acetate paints overcome common problems such as peeling. In the past, such problems made the use of water-thinned paint impracticable for weathered exterior surfaces.

Mr. Becker stated that by using the new formulations, emulsion paints could be made to penetrate weathered paint and could also be made to adhere to asbestos shingle, painted wood or other surfaces beneath.

Additional advantages, Mr. Becker continued, are absence of yellowing in white paints, superior brightness in tints and a high rate of water vapor transmission or "breathing," a property that tends to eliminate blistering. Also, no surface preparation is normally required.

The significance of the new formulations, Mr. Becker concluded, is that the consumer, accustomed to the ease of application and clean-up of emulsion paints for interior work, will be able to use them for exterior work as well.

BEST AEROSOL CONTAINER: Martin-Senour Paint Co. officials admire the award presented for the best aerosol paint container at the annual contest sponsored by the Chemical Specialties Mfrs. Assoc. Tom Andrews, director of marketing (center), and William F. Hancock, general superintendent (right), hold the award, while Edward Borst, purchasing agent, holds the winning entry.

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Protective Coatings Divisional Conference

The protective coatings division of the Chemical Institute of Canada held its twelfth divisional conference at Toronto and Montreal, February 20 and 21.

The technical session began with a talk by J. Kelly, group leader, Canadian Industries, Ltd., Toronto, on gas-liquid chromatography in the paints industry. Mr. Kelly described the principles of gas-liquid chromatography and how this technique has developed in the past five years.

W. W. Reynolds of the Shell Oil Co. Wood River Research Laboratory gave an evaluation of the functional role of the solvent in protective coatings.

Following Mr. Reynolds' talk, a paper was presented by Joseph V. Prane, head oil and resin development laboratory, National Lead Co., Phila. The paper described the steps taken in the development of an exterior acrylic latex paint from the original sales department request through to the production of the first plant batch. Throughout the paper, visual representation was made of the tests and apparatus used.

J. Kelly

I. Balinkin

After luncheon, the session was continued by a talk on the nature of color. Isay Balinkin, professor of experimental physics at the University of Cincinnati, presented a lecture-demonstration on the basic concepts involved in color perception. Models were used to draw an analogy between optical and easily observed mechanical processes.

A talk by L. J. Frost, manager of research at the Continental Can Co. of Canada, Ltd., concluded the program. Mr. Frost discussed the performance of decorative and protective coatings in the metal container industry.

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STEEL CONTAINERS

Give *your* paint products positive packaging protection in Continental steel containers. Choose from Continental's complete line—available in sizes 2 through 12 gallon. Get fast delivery of all the containers you need. For hard-to-hold products, Perma-Lined containers provide 100% protection. Perma-Lining enamels are airless hot sprayed to assure complete interior coverage. Get the benefits of famous Continental service, too. Research and engineering assistance help you solve any problem. Call soon.

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Central Division: 135 So. La Salle St., Chicago 3
Pacific Division: Russ Building, San Francisco 4

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This flame test, and the other tests shown, prove that Velsicol's new X-37 resin can be used with silicones to produce aluminum paints with a high degree of heat resistance. By using X-37 to extend silicones, you can substantially reduce raw materials costs. X-37 comes solid or flaked, and is available in commercial quantities. Get all the facts about X-37 now, without cost or obligation.

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LINSEED OIL is still the "LIFE" of Outside House Paint

The chances are that *your own home* is protected by a good *linseed oil* paint.

You chose it because you are sure of its performance; its durable, level and repaintable surface. Your confidence in it is based on years of experience with linseed oil as a paint material. You know what to expect in the life of the coating, in adhesion to wood. You know that at repainting time there will be no new unthought of expensive problems which sometimes occur with non-linseed oil exterior paints. The cost will be reasonable.

As a manufacturer you know other good things about linseed oil. It is compatible with pigments. Its processing is predictable. It requires no special handling. You know that a high grade linseed oil paint can always be made and marketed with profit and with good value to the ultimate user.

SPENCER KELLOGG AND SONS, INC.

BUFFALO 5, N. Y.

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ASBESTINE 325

64 YEARS of production have paid off for International Talc Co. and its customers. As the world's largest producer of magnesium silicate, International Talc Co. announces the availability of their newest member to the family. . . . Asbestine - 325

★ THIS NEW PRODUCT FEATURES

Good dispersion with minimum use of oil needed in grinding. . . . enables formulating at higher pigment volume concentrations. Thereby. . . .

REDUCING RAW MATERIAL COSTS

without affecting performance of storage characteristics.

Also available in other grades. . . .featuring these advantages

- **1. Available in low, medium and high oil absorption**
- **2. Pure white — suitable for white or colored paints**
- **3. Acicular structure affords good suspension**
- **4. Mixes readily in all paint vehicles**
- **5. Contributes to greater durability in exterior paints**
- **6. Excellent flatting agent for flat or semigloss coatings**
- **7. Uniformly low moisture content (less than .5% loss at 212°F.)**
- **8. Bulking value 4.2 gallons per 100 lbs.**
- **9. Packed in 50 lb. paper sacks for your convenience**

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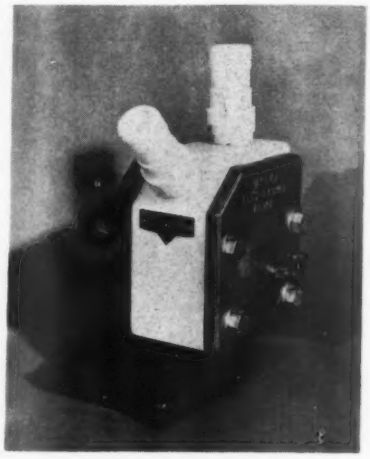
NEW MATERIALS & EQUIPMENT

A MONTHLY MARKET SURVEY

This section is intended to keep our readers informed of new materials and equipment. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.



VANTON

POLYETHYLENE PUMP
Increased Temperature Range

New Marlex 50 polyethylene pump construction makes it possible to handle extremely corrosive fluids up to 260°F. Conventional polyethylene is limited to 140°F.

New material also possesses close dense molecular structure which results in high tensile strength and low permeability. Said to offer excellent impact strength and high degree of crystallinity.

Available in capacities from ⅓-40 GPM.

Vanton Pump & Equipment Corp., Dept. PVP, 201 Sweetland Ave., Hillside, N. J.

SILICONE INTERMEDIATE
Epoxy Type

An organo functional silicone intermediate identified as Syl-Kem 90 has been introduced.

Product is an epoxy silicone combination with an epoxy group on each end of the molecule, 1,3-bis [3-(2,-3-epoxypropoxy)propyl] tetramethyl-disiloxane. Epoxy groups undergo typical reactions of glycidyl ethers.

Chemical said to greatly improve resistance to low temperature cycling when added to common epoxy casting resins. May also be used in epoxy curing agents and as reactive deluent.

New Products Dept., Dow Corning Corp., Dept. PVP, Midland, Mich.

GAS-VAPOR CHROMATOGRAPHY
Wider Application

New research model Kromo-Tog for the application of gas and vapor chromatography to wider areas.

With new model K-5 Kromo-Tag, it will be possible to analyze materials that boil up to 475°C. and higher, including fatty acids.

BURRELL

Model available either with one or two complete systems and the two system instrument may have have either one or two recorders.

Two system model has separate columns, detectors, controls and fraction collectors for simultaneous analysis of two separate samples.

Detectors are extremely sensitive. Other features include independent temperature control of both columns and detectors, rapid heating and cooling, proportioning heat control and specially designed glass or metal columns. Maximum power consumption is 3500 watts.

Burrell Corp., Dept. PVP, 2223 Fifth Ave., Pittsburgh 19, Pa.

DEFOAMER
All-purpose Compound

Defoamer 711 now available. Claimed to be an all-purpose antifoam compound, suitable for use in either water or solvent systems.

Defoamer said to contain no silicones, will not separate out and no agitation is required to maintain it at peak efficiency. It has good compatibility, and is stable and active in acid, alkaline or hard-water media. Also non-ionic and unaffected by temperature changes.

Isochem Corp., Dept. PVP, 221 Oak St., Providence 9, R. I.

FORK TRUCKS
Electric Powered

EC-20 electric model having a 2000 lb. capacity is now available.

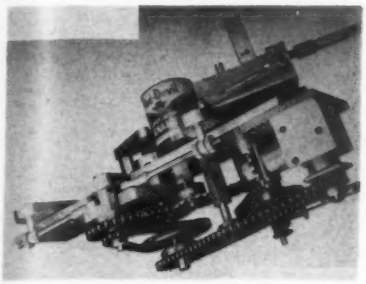
Performance advantage of machine said to stem from use of new type of "carbon pile" drive control which provides constantly smooth acceleration and permits full control of "inching" during delicate stacking operations.

CLARK

Features include easier steering and positive tractive power. Directional control lever and lift-tilt lever within finger-reach of the operator. Model will climb ten per cent grade with full load.

Claimed to travel up to 6.5 mph both forward and reverse. Has lift speed, loaded, of 50 feet per minute, and a turning radius of 62 inches.

Industrial Truck Division, Clark Equipment Co., Dept. PVP, Battle Creek, Mich.



INDUSTRIAL MARKING

CONTAINER PRINTER-CODER
Automatic Operation

New container printer-coder for paint cans introduced. Designed for completely automatic operation, and for attachment to filling equipment, the marker utilizes flexographic printing.

Adjustable through full range of sizes from 3″ to 6″ diameters. Simple hand wheel adjusts printing head for can sizes and circumferences. Motivation power taken from the filling unit.

Claimed speeds can be obtained at 60 per minute and higher.

Inking system is vertical, external pump type, without valves or pipes, and uses a quick drying aniline ink.

Interchangeable rubber printing dies molded in one continuous length for marking one-gallon containers. Duplication and over printing on smaller sizes prevented.

Industrial Marking Equipment Co., Inc., Dept. PVP, 454 Baltic St., Brooklyn 17, N. Y.

PVC DISPERSION
For Plastisols and Organosols

A polyvinyl chloride dispersion resin developed for plastisol and organosol applications has been introduced.

Called Pliovic VO, product said to exhibit exceptional electrical properties and viscosity stability characteristics. Wide flexibility in choice of compounding ingredients made possible through low initial viscosity and good shelf life. Said to have low watter absorption.

Among applications are decorative and protective metal coatings and hot dip and cold dip compounds. Metal coatings based on product said to be easily spread or spray applied.

Chemical Division, Goodyear Tire & Rubber Co., Dept. PVP, Akron 16, Ohio.

DRUM HANDLER
One Man Operation

Upright lifting and transporting of open top drums, strain-free handling of 1,000-pound drums, raising drums to drain stands or placing on scales may be accomplished by one man using CeCOR Model 66H drum handler.

COOLANT

Easy-to-operate hydraulic lift raises loaded drum. Operator does not touch drum or bear weight. Useful for weighing drums of solvents or paints. Maximum lift with 55-gallon drum is 16 inches. Clamp fully adjustable for variations in drum height as well as chime thickness.

Mounted on two 12-inch diameter oil-resistant, rubber tire, roller bearing wheels and one eight-inch diameter oil resistant, rubber tire, ball bearing caster.

Coolant Equipment Corp., Dept. PVP, Verona, Wis.

DUMP BUCKET SCOOPS
Bulk Handling

Hydraulic and mechanical dump bucket scoops for bulk handling of

NEW MATERIALS — EQUIPMENT

chemicals and other materials are now offered.

Hydraulic dump bucket scoop, available in either 5 or 10 cubic foot capacities, is operated from controls right in the driving compartment. Has maximum upward tilt of 30° and downward tilt of 45°.

Mechanical dump bucket scoop, offered in the same cubic foot capacities, has upward tilt of 10° and downward of 45°. Release mechanism is included on the scoop which automatically locks it in the loading position when surface is contacted.

Scoops come in different models. Model "E" available in capacities to 4000 pounds.

Lewis-Shepard Products, Inc., Dept. R8-3, Dept. PVP, 125 Walnut St., Watertown 72, Mass.

COLOR DISPENSER

Electronically Matches Colors

Color dispenser developed which gives accurate color reproduction with high speed.

Any color can be reproduced accurately. Machine has two dials. One is to select the right colorant and the other the right amount. The right amount of each tinting agent is then dispensed. The resulting color mix will match perfectly the chip in the custom color reference.

Paint Marketing Department, W. P. Fuller & Co., Dept. PVP, 301 Mission St., San Francisco, Calif.

FISHER

COLORIMETER

Reproducible Measurements

ASTM color scale reported to have 16 uniformly spaced, precisely defined color intervals for matching oil samples.

Color of each step is specified according to the "chromaticity" coordinates established by the International Commission on Illumination. New ASTM colors said to be based on spectrophotometric analysis of a wide variety of petroleum products, made by the Bureau of Standards.

Color glasses supplied with every colorimeter reported now identical, within ±0.006 chromaticity.

Colorimeter uses 115-volt, 50 or 60 cycle a-c or 115-volt d-c.

Fisher Scientific Co., Dept. PVP, 384 Fisher Bldg., Pittsburgh 19, Pa.

LIQUID EPOXY RESINS

Basic Resins Introduced

D.E.R. 332 said to possess characteristics previously unattained in the epoxy field.

Reported to be unique in that it is water clear, extremely uniform and has a very low viscosity.

Also introduced was D.E.R. 331, a standard unmodified resin suita-

able for customary use in tooling and casting.

D.E.R. 334, modified low viscosity resin, claimed to be especially suited for laminating.

Dow Chemical Co., Dept. PVP, Midland, Mich.

BARRETT-CRAVENS

HAND LIFT TRUCK
Light Weight And Sturdy

Multiple stroke, 250 pound truck with 48″ platform, designed to speed the lifting and handling of skid loads up to 2500 pounds.

HD hydraulic hand lift model has all-welded, ribbed, aircraft type construction frame said to give unusual strength and stability.

Fast operating foot lift pedal conveniently located. Ten strokes give a full 4½″ lift. Wheelbase is 8-11/16″ from platform stop to centerline of front wheels.

Hydraulic lift pump and ram housed as compact single-package unit, vertically mounted assuring minimum friction. Slow or rapid load descent can be easily adjusted for.

HD models have lowered heights 6,7,9,11 inches. Various platform lengths and widths available.

Barrett-Cravens Co., Dept. PVP, 628 Dundee Rd., Northbrook, Ill.

TWO-LINE PISTON FILLER
Many Features

Model 15NH2 said to be completely new, low cost two-line piston filler.

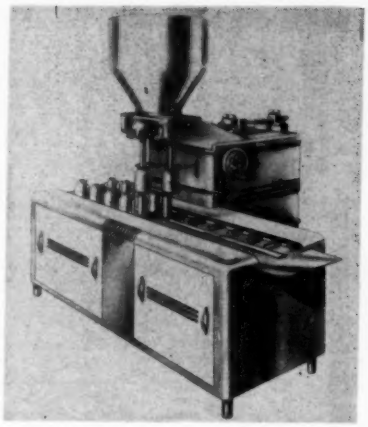
Designed to handle liquid, semi-viscous products, the model described as being extremely flexible and easy to operate.

Features include adjustable head height and a rising table provides "bottom up fill" with table height being simply adjusted.

Each filling line has "no container—no fill" divice. New diagonal filling position said to give handling advantages and conserve space.

Model also has variable speed drive, speeds ranging from 15 to 30 cycles.

Filling range reported as ¼ oz.



HOPE

TALL OIL TALK FROM Arizona

CHEMICAL COMPANY

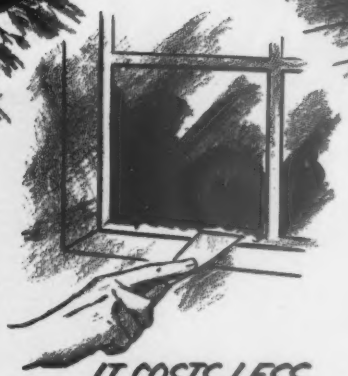
World's largest producer of products based on Tall Oil

THERE ARE NO FASTER-DRYING PAINTS

THAN THOSE CONTAINING DRIERS MADE WITH **ACINTOL*** TALL OIL FATTY ACIDS. THESE LOW-COST 'TALLATES' ARE EQUAL TO NAPHTHENATES IN DRYING EFFICIENCY---ARE MADE BY THE SAME PROCESSING TECHNIQUES - AND OFFER AN EXTRA BENEFIT IN READY AVAILABILITY.

WHAT MAKES IT "TALL"?

THE SWEDISH WORD FOR PINE IS "TALL" AND IT HAS BEEN RETAINED IN NAMING THE OIL MADE FROM PINE PULP IN PAPERMAKING. "BIGGEST" IS THE WORD THAT DESCRIBES ARIZONA AS A MANUFACTURER AND PROCESSOR OF TALL OIL...A POSITION BUILT ON PRODUCT SERVICE AND DEPENDABILITY.



IT COSTS LESS TO PLUG HOLES

WHEN **ACINTOL D** DISTILLED TALL OIL OR **ACINTOL F-1** FATTY ACIDS ARE USED AS THE ACIDIC COMPONENT IN PUTTIES. ALSO BENEFITTING FROM THESE LOW-COST FORMULATIONS ARE CAULKING AND GLAZING COMPOUNDS.

FAST-DRYING LONG-OIL ALKYDS

BASED ON **ACINTOL** TALL OIL FATTY ACIDS ARE THE RESULT OF NEW HIGH-POLYMER TECHNIQUES. THEY DRY LIKE SOYA ALKYDS BUT COSTS ARE BASED ON THE ECONOMICAL **ACINTOLS**. FINE FOR OUTSIDE TRIM AND TRELLIS PAINTS, TOO. !

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No lab should be without one! Many are the wonderful tales about Tall Oil. Yours may win a prize. Send us your most interesting application story. If it's first to arrive and we use it in an ad, you get a 55-gallon drum of ACINTOL* of your choice or its value in cash! **EVERYONE WINS SOMETHING!** Whether or not your idea is used, you'll receive a handsome prize for your entry. Just jot down your idea, name and company and send to:

Arizona Chemical Company

(INCORPORATED)

30 Rockefeller Plaza, New York 20, N. Y.

*Reg. U. S. Patent Office

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to a gallon. Filling speeds vary from 10 to 60 or more containers per minute.

Hope Machine Co., Dept. PVP, 9400 State Road, Philadelphia 14, Pa.

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Light Weight

Light weight, flexible fire hose has been designed for use in chemical industry.

Hose has guaranteed test pressure of 400 pounds. Constructed of Neoprene cover and tube with Dacron filler and cotton warp. Recommended for use where contaminated water is likely to be encountered during a fire.

Goodyear Tire & Rubber Co., Dept. PVP, Akron 16, Ohio.

HOPPER FEEDER
For Transfer Applications

New air-operated, high-suction hopper feeders available. Said to offer simple and inexpensive means for transferring fluid materials, either wet or dry, from bulk bins or shipping containers, into all types of processing machinery or vice versa.

VAC-U-MAX

Provided with a newly developed discharge valve that closes automatically when unit is in operation.

Operates entirely on compressed air and has no moving parts in suction unit.

Materials do not mix with high pressure air. Units equipped with internal filters for fine materials and can be cleaned without being removed.

Vac-u-Max, Dept. PVP, 1 Montgomery St., Belleville 9, N. J.

POLYVINYL ACETATE
Versatile Emulsion

Two new polyvinyl acetate emulsions available to be sold under the designation "Elvace."

"Elvacet" 1423, a copolymer emulsion, may be used without adding a plasticizing agent. "Elvacet" 1440, a homopolymer emulsion, requires the addition of a plasticizer to achieve flexibility.

Said to be easily applied by brush, roller or spray gun and dry to the touch in 30 minutes. Have no lingering odor and resist yellowing or discolorization.

E. I. Du Pont de Nemours & Co., Inc., Dept. PVP, Wilmington 98, Del.

MATERIALS HANDLING
Explosion-Proof

New 54.00 Go-Getter said to be designed for use in explosion hazard areas.

Threaded joints are utilized for safety not only in operation but for ease of maintenance to minimize errors in reassembly.

Revolvator Co., Dept. PVP, North Bergen, New Jersey.

SAFFLOWER OIL SUPPLY TO DOUBLE IN 1958!

New Safflower plantings in the Great Plains Area—as well as in California—will assure:

1. A guaranteed supply for all your needs on a long-term contract basis.
2. Stable prices.
3. Lower delivered price at Eastern and Mid-West points.

While production is going up, demand is rising, too. Better check your PVO man for information on a long-term contract at a favorable price.

PVO OILS VARNISH PAINT & PACIFIC VEGETABLE OIL CORP.

Pacific Vegetable Oil Corp.
62 Townsend Street
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1	ATLANTA, GEORGIA G. R. Nottingham Co.
2	BOSTON, MASSACHUSETTS R. B. Huber, Sales Engineer
3	CHICAGO, ILLINOIS Daniel G. Hereley Co.
4	CLEVELAND, OHIO Donald McKay Smith Company
5	DALLAS, TEXAS W. W. Richerson Company
6	DETROIT, MICHIGAN George E. Moser & Son, Inc.
7	HOUSTON, TEXAS Texas Solvents & Chemicals Co.
8	KANSAS CITY, MISSOURI Ack Sales Company
9	LOS ANGELES, CALIFORNIA Pacific Vegetable Oil Corp.
10	LOUISVILLE, KENTUCKY The Argus Co.
11	MILWAUKEE, WISCONSIN J. W. Copps
12	MINNEAPOLIS, MINNESOTA Horton-Earl Co.
13	MONTREAL, CANADA B. & S. H. Thompson & Company, Ltd.
14	NEW YORK, NEW YORK Pacific Vegetable Oil Corp.
15	PHILADELPHIA, PENNSYLVANIA Baker Industrial Oils Co.
16	PORTLAND, OREGON W. Ronald Benson, Inc.
17	SAN FRANCISCO, CALIFORNIA Pacific Vegetable Oil Corp.
18	SEATTLE, WASHINGTON W. Ronald Benson, Inc.
19	ST. LOUIS, MISSOURI Ivan T. Bauman Co.
20	TORONTO, CANADA B. & S. H. Thompson & Company, Ltd.

PERSONNEL CHANGES

BENNETT'S

Orson Goodyear has become production manager of the new production division and **Lyman Hunter**, a company vice president, retains responsibility for the operation of the technical division, it has been announced.

L. Hunter

O. Goodyear

Mr. Goodyear started with the organization in 1933. He has had many years of experience in technical and production work.

Mr. Hunter joined the firm in 1925. In his new capacity, he will devote his entire attention to directing the firm's technical efforts. Mr. Hunter is a director of the Federation of Paint and Varnish Production Clubs.

S. J. Spencer

R. E. Moon

Ralph E. Moon was named vice president, metropolitan paint sales and **Stanley J. Spencer**, vice president, marketing, it has also been announced.

FERRO CORP.

Harry T. Marks, executive vice president, has been elected president of the firm's Board of Directors, it has been announced.

Mr. Marks has been with the company for 25 years. He will continue to carry out his present duties while assuming the position made vacant by the death of C. D. Clawson.

He began his career with the firm's Canadian subsidiary as plant superintendent, and has been export manager, managing director of Ferro Brazil, manager of the international division, vice president-foreign operations and vice president-administration.

UNITED WALLPAPER

Richard J. Anderson has been appointed head chemist of the firm's trade sales laboratory, it has been announced.

R. J. Anderson

In his new capacity, Mr. Anderson will direct all research and development.

Before assuming his present position, Mr. Anderson had been administrative assistant to the technical director of the company's central research laboratories.

Mr. Anderson is 30 years old. He was graduated from the Illinois Institute of Technology with the degree of B.S. in chemical engineering.

UNITED STATES GYPSUM

James V. Anderson Jr. has been appointed Virginia district sales manager, with headquarters in Richmond, it has been announced.

Mr. Anderson has been large-job salesman in the Washington D.C. office. He joined the company in 1952.

R. W. Zollers has been named Washington, D.C. district sales manager, it has also been announced.

Included in Mr. Zoller's new jurisdiction are the Washington and Baltimore areas.

He was replaced in Syracuse, where he held a similar post, by **K. C. Stowell.**

FREEMAN CHEMICAL

William F. Rutherford has been appointed to the firms's technical staff, it has been announced.

VELSICOL CHEMICAL

Dr. George C. Schweiker has been named manager of research, it has been announced.

G. C. Schweiker

Dr. Schweiker will be responsible for the basic research programs of firm's research and development department.

He had previously been associated with the Hooker Electrochemical Co. where he served as supervisor of polymer research. He was also an instructor in chemistry at the Drexel Institute of Technology.

Dr. Schweiker received his Ph.D. from Temple University in 1953.

He is a member of the American Chemical Society, Sigma Xi and the American Association for the Advancement of Science.

B. Gene Carter has joined the firm's sales staff in the Midwest as technical sales representative, it has been announced.

B. G. Carter

Mr. Carter is a graduate of Texas A. & M. with a B.S. in Entomology. His area is to include Ohio, Kentucky, Michigan, West Virginia and the western portions of Pennsylvania and New York. He is to maintain headquarters in Columbus, Ohio.

HILTON-DAVIS

William J. Ulmer has been named a technical sales representative to the protective coatings industry in Southeastern U. S., it has been announced.

Mr. Ulmer has been with the company in an administrative capacity since 1955. He will maintain headquarters in Atlanta, Ga., and will cover Georgia, Florida and North and South Carolina.

He received his technical training at Purdue University and the University of Cincinnati.

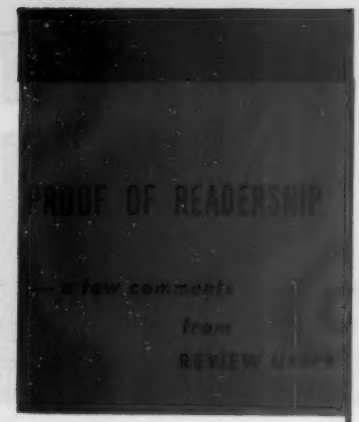
KOPPERS CO.

George H. Sollenberger has been appointed product manager for Super Dylan polyethylene, and **Henry C. Lavely** has been named product manager for Dylite expandable Polystyrene, it has been announced.

Mr. Lavely and Mr. Sollenberger had both been associated with the development department of the firm's chemical division. Both men had been transferred from the Kobuta Development Laboratory at Monaca, Pa., to the firm's Pittsburgh headquarters.

PAINT and VARNISH

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES



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LOS ANGELES, CALIF. — *"Keep up the good work."*

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44

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CAPITOL PRODUCTS

George H. Stram has been appointed chief engineer of chemical equipment, it has been announced. Mr. Stram most recently headed his own engineering organization. Prior to that, he was chief engineer of the sprayer department for the York division of the Oliver Corp.

G. H. Stram

He has served on a variety of industrial and governmental committees on construction and development of chemical equipment.

Mr. Stram is a member of the National Society of Professional Engineers.

PITTSBURGH COKE

Edward H. Winkleman has been named Eastern regional sales manager of the industrial chemicals division, it has been announced.

Mr. Winkleman is a former sales representative for the division. He joined the company in 1954, after being associated with the U. S. Testing Co. and Rockefeller Center, Inc.

Edgar I. Crowley and **John R. Weinert** have joined the firm's research and development department, it has also been announced.

Mr. Crowley joins the department's engineering development section as a senior chemical engineer. He had formerly been with Davison Chemical Co. and Gulf Research and Development Co. He is a graduate of Kansas State College.

Mr. Weinert becomes a senior chemist in the protective coatings section. He is a graduate of the University of Pittsburgh, and he has been a research associate at the Mellon Institute.

DIAMOND ALKALI

Chester D. Rudolf, group leader of the firm's silicate, detergent, calcium division research and development activities, has become general superintendent of the division, it has been announced.

Mr. Rudolf joined the firm in 1954, after being associated with the New Jersey Zinc Co. as an engineer. He is a graduate of the University of Wisconsin.

George V. Olle, assistant superintendent of the division's pure calcium products plant, has become superintendent of the plant, it has also been announced. He succeeds Raymond R. McClure, who retired recently.

Mr. Olle has been with the company since 1929, when he joined the firm as assistant foreman of the pure calcium products plant. He was promoted to foreman in 1941, and became assistant superintendent eight years later.

UNION CARBIDE CHEMICALS

Marvin R. Huffman recently joined the quality control laboratory at the South Charleston, W. Va. plant, it has been announced.

Mr. Huffman received a B.S. degree in chemistry from Roanoke College in 1955. Previous to joining the firm, he served in the Armed Forces.

A. C. HORN

Philip Landau has been appointed chief plant chemist for the Long Island City plant, it has been announced.

Mr Landau will be responsible for integrating the technical efforts of the research laboratories with the production department. He will also be in complete charge of quality control, standards and specification systems for the plant.

CALIFORNIA INK

Hobart Gillespie has been named field salesman in the eastern United States, it has been announced.

H. Gillespie

Mr. Gillespie has had extensive experience in the fields of color merchandising and color communication systems.

Since his discharge from the Army in 1946, he has been actively engaged in the merchandising of trade sales paints.

He had previously been associated with Cook Paint & Varnish Co. and the Rockford Paint Co.

SINCLAIR CHEMICALS

Robert L. Hart has been named district sales representative for the firm, it has been announced. His headquarters will be located in Philadelphia.

R. L. Hart

Mr. Hart attended Michigan State University and received his degree in chemical engineering.

He joined the company in 1950 as an industrial sales engineer.

In 1954, Mr. Hart became sales engineer for the Chicago area.

MARTIN-SENOUR

Fred Randall has retired after 35 years as a salesman for the company, it has been announced.

Mr. Randall represented the firm in the Dayton, Ohio area. He was honored as the firm's Salesman of the Year" in 1954.

CORN PRODUCTS SALES

Michael D. Mullin has been named director of bulk product sales, it has been announced.

Mr. Mullin is a graduate of Iowa State College, where he received a degree in Chemical Engineering. He has been with the firm for 24 years in a variety of sales and marketing positions.

Thomas A. Bruce has been appointed assistant to the general sales manager, it has also been announced.

Mr. Bruce, who started as a 15-year-old student, has been with the firm for 40 years. He is a graduate of Bradley University, and has had assignments in manufacturing and research as well as sales.

KENETIC DISPERSION

V. Roman Snazuk has been elected treasurer of the firm, it has been announced by Charles H. Kew, president.

V. R. Snazuk

Mr. Snazuk was formerly affiliated with Weather-panel Sidings, Inc. as plant manager and prior to that time, was a senior accountant with the accounting firm of J. D. Elliott and Co.

GOODYEAR

C. P. Moore has been named representative for the chemical division, it has been announced.

Mr. Moore will service various accounts in both North and South Carolina. He is a graduate of Catawba College, N. C.

Donald B. Hefner has been appointed field representative at Charlotte, N.C., it has also been announced.

Mr. Hefner was graduated in 1957 from Kent (Ohio) State University. He has been associated with the firm since 1950 as a member of the production training squadron.

Oka Carlson has become manager of the company's new plastics plant at Apple Grove, W. Va., it has been announced.

The plant, which will go into production in 1959, will produce a new polyester film.

Mr. Carlson has been with the firm since 1941. He recently was superintendent of cascade operations at the atomic corporation. He holds a B.S. degree from the University of Minnesota.

R. E. Dyer has been appointed special representative for the chemical division, it has been announced, and will have his headquarters in Cleveland.

Mr. Dyer has been with the organization since 1954. He is a graduate of the University of Toledo.

C. H. Smith has been transferred from the Philadelphia field office to Minneapolis, it has been announced. He is to be a special representative of the chemical division.

Mr. Smith has been with the company since 1955. He had six years of previous experience in the paint industry, and he is a graduate of North Dakota State College with bachelor's and master's degrees in protective coatings.

He is a member of the Louisville Paint and Varnish Production Club, the American Chemical Society and the American Society for Testing Materials.

WITCO CHEMICAL

Capt. Floyd B. T. Myhre has been appointed assistant to the president, in charge of the company's Washington office.

F. B. T. Myhre

Capt. Myhre will serve as Washington representative for the firm and all its divisions.

Capt. Myhre, retired, USN, since 1947, worked with the National Security Industrial Assn. as Washington Navy liason and on many of the association's advisory committees.

Since 1955, he has served as Washington representative for various concerns.

Capt. Myhre graduated from Annapolis in 1931. During World War II, he was commanding officer of two destroyers.

His decorations include the Silver Star and Legion of Merit.

DU PONT

Dr. Marshall F. Acken has been appointed to head a new sales development section of the firms explosives department, it has been announced.

Dr. Acken has been with the company since 1931. His experience in the explosives department includes research, sales and production, and an assignment in the company's part of the government's atomic energy program.

He received his Ph.D. from Pennsylvania State University.

Henry H. Herring has been named assistant manager of the new sales development section, it has been announced.

Mr. Herring has been with the firm for 19 years, and in 1956 was appoiinted manager of technical service and development.

Herman R. Woodall has become manager of the explosives department, succeeding Dr. Acken, it has been announced.

Mr. Woodall has been assistant manager of the chemical sales section for the past eight years. He has been associated with the company since graduation from the University of Tennessee in 1937.

William Reynolds has become assistant manager to Mr. Woodall, it has also been announced.

Mr. Reynolds has been with the company for 18 years starting as a sales engineer.

He received his B.S. degree from Pennsylvania State University.

Appointment of four section managers for the new technical service laboratory of the pigments department has been announced.

Dr. Willard H. Madson has been named manager of the trade sales paint section; **George Wormald**, manager of the industrial and automotive finishes section; **Dr. Harold C. Brill**, manager of the paper, ink and fibers section; and **Robert H. Zabel**, manager of the plastics and elastomers section.

Dr. Madson joined the company in 1933. He has specialized in research and sales service work on pigments. He has written numerous technical papers on titanium dioxide pigments.

Mr. Wormwold joined the firm in 1936. For the past 11 years, he has worked in the color sales service laboratory as a chemist.

Dr. Brill, prior to this appointment, was a color sales service laboratory research supervisor. He has been with the firm since 1935.

Mr. Zabel, a graduate of the University of Wisconsin, joined the organization in 1948. For the past nine years, he has been assigned to the Newark sales service laboratory.

Other appointments announced include **Dr. Wesley G. Vannoy**, supervisor, exterior trade sales finishes; **Frederick A. Lilley**, supervisor, interior trade sales finishes; **Thomas B. Reeve**, supervisor, general industrial finishes; and **Dr. Roy J. Fahl, Jr,.** supervisor, automotive finishes.

GENERAL DYESTUFF CO.

Walter R. Brandt has been appointed branch manager of the West Coast sales office, it has been announced. He will also act as Western regional manager for Antara Chemicals.

Mr. Brandt joined the company at its Boston sales office in 1931. For the past six years he has been manager of textile, paper and leather chemicals in the company's main sales offices in New York.

He is a graduate of Bowdoin College.

JONES-DABNEY

W. Clagget Martin was named general manager of the eastern division, it has been announced.

C. W. Slocum

W. C. Martin

Mr. Martin succeeds **Clarence W. Slocum**, who retired after 45 years in the paint business.

Mr. Martin's career with the firm began in 1938 as a salesman. He became general sales manager of the eastern division in 1950, and four years later was promoted to vice president.

Mr. Slocum's distinguished career in the paint industry saw him a president of Beckwith-Chandler Co. for 33 years. He has held many other prominent positions and has been a member of various industry and civic boards and committees.

H. KOHNSTAMM & CO.

Louis Agre has been appointed sales representative for the Metropolitan New York and northern New Jersey area, and **Howard Zimmer** has been assigned to the Washington and Oregon areas, it has been announced.

Mr. Agre is a graduate in Chemical Engineering from the University of Pennsylvania. He taught Chemistry for a year before joining the chemical staff of Industrial Sales Corp. as sales representative in the Eastern area. He later became a sales director of Texas Eastern Oil Distributors.

Mr. Zimmer, a pharmaceutical chemist, operated his own drug business after receiving graduate training in organic chemistry, pathology and bacteriology at Oregon State's North Pacific College of Pharmacy. He has had sales experience with Wyeth Division of American Home Products and Chas. Pfizer & Co.

HERCULES POWDER CO.

Richard T. Yates has been appointed director of sales, naval stores department, it has been announced.

Mr. Yates has been with the company since 1929, after graduation as a chemical engineer from Virginia Polytechnic Institute. He has had considerable experience in technical sales and in managerial sales positions. He has been manager of the agricultural chemicals division of the naval stores department.

James W. Cleary has been made manager of engineering of the cellulose products department, and **Herbert F. Schaeffer** has become senior technical representative of the market development division of the synthetics department, it has also been announced.

Mr. Cleary joined the firm in 1936 after graduation from the University of Delaware. He has had extensive supervisory experience in plant management, and was assistant plant manager at Parlin, N. J.

Mr. Schaeffer has been with the company since 1940, when he became a chemist at the research center. He has chiefly been concerned with sales and marketing research, having served as assistant to the manager of sales research.

Three new assignments in the Virginia cellulose department have been announced.

J. G. Jarrell has been named the department's district manager in San Francisco.

Mr. Jarrell joined the firm in 1948 as a chemist, after graduating from the University of Delaware. Last year, he was named district manager of the Detroit territory.

Homer Green has been appointed the department's assistant district manager in San Francisco.

Mr. Green was engaged in sales work with the Huron Milling Co. which was acquired by his present firm in 1956. For the past year, he has been in charge of sales in the San Francisco district.

George Reasor has become the department's district manager in Detroit.

Mr. Reasor joined the company in 1950. Last year, he was named technical representative in the Detroit district. He is a graduate of the University of Missouri.

PATTERSON FOUNDRY

Robert B. Mack has been named product manager of mixing and drying equipment and **William C. Sturgeon** has been appointed to succeed Mr.. Mack as manager of customer service, it has been announced.

R. B. Mack

W. C. Sturgeon

Mr. Mack has been associated with the firm since 1940, holding numerous positions in engineering and sales departments.

Mr. Sturgeon, a graduate of the U. S. Naval Academy at Annapolis, joined the company in 1954. He has served in various sales and product application assignments.

BAKELITE CO.

Roger A. Calsibet has been appointed assistant manager of the new product engineering department, it has been announced.

Mr. Calsibet will supervise and assist the company's technical personnel in sales development of new products.

Mr. Calsibet joined the firm in 1948 after graduation from Princeton University.

Bruce E. Godard has been named group leader in the solvent coatings group at Bound Brook, N.J., it has been announced.

He is a graduate of Fordham University and has been with the firm since 1948. He has specialized training in sales development of epoxy materials and applications.

Stanley H. Richardson has been transferred to the new products engineering department at the company's New York headquarters, it has also been announced.

In his new post, he will be responsible for sales development of plastics in the laminating and epoxy coating field.

Mr. Richardson joined the company's research department in 1933. He has received an M. S. degree from Stevens Institute of Technology.

BALTIMORE PAINT & COLOR

Edward Miller has been appointed chief chemist of the product finishes department and **William J. Quinlan** has been promoted to manager of the product finishes department, it has been announced.

Mr. Miller is a graduate of the University of Chicago. He had previously been associated with Roxalin Flexible Finishes and Midland Industrial Finishes.

Mr. Quinlan has been with the organization since 1950. For the past three years, he has held the position of chief chemist of the product finishes department.

BRIGGS-MARONEY

Joseph F. MacSweeney has been elected president of the company, it has been announced.

He has previously been manager of internal operations. He is a graduate of Boston College, and after serving three years with the Army, joined the firm in 1946.

GLIDDEN CO.

John R. Lawrence has been named polyester coordinator, it has been announced.

Mr. Lawrence will be responsible for the development and sale of the firm's polyester products.

Mr. Lawrence was formerly associated with the Rohm & Haas Co. as a development engineer. He is a 1948 graduate of Yale University.

NOPCO

Thomas J. Campbell has become sales manager of the firm's subsidiary, Metasap Chemical Co., it has been announced. He succeeds O. E. Lohrke.

Mr. Campbell had formerly been assistant sales manager of Metasap, and he has a background of 20 years of field and home-office experience.

AMERICAN CYANAMID

A. J. Perantoni, who has been with the advertising department of the firm, recently assumed new sales duties with the division's explosives department in Latrobe, Pa., it has been announced.

Mr Perantoni joined the company in 1952. He is a graduate of Princeton University.

Robert A. Olson has been appointed to the Philadelphia office of the pigments division, it has also been announced.

Mr. Olson was formerly with the Los Angeles office.. He will be responsible for pigment sales in various eastern locales.

Ben F. Melucci has been appointed commercial development manager of the industrial chemicals division, it has been announced.

Mr. Melucci had formerly been technical director of the division's manufacturers chemicals department. He joined the firm in 1946, and has been a chemical engineer at the Stamford Laboratories and was in charge of the acrylonitrile pilot plant operation.

He is a graduate of Columbia University in Engineering, and a member of the American Institute of Chemical Engineers, American Chemical Society and the American Ordnance Assoc.

ADELPHI

Gabriel Romain has been appointed industrial sales representative, it has been announced.

Mr. Romain, former owner of the Romain Paint Co., will service industrial firms in the Connecticut and New York area.

KENTUCKY COLOR & CHEMICAL

The following changes in personnel have been announced:

Sevier Bonnie, Sr. has been elected to chairman of the board of directors.

Robert P. Bonnie, who has been company secretary since 1919, was elected to the position of president and treasurer.

R. M. Ladd has been elected vice president in charge of production and made a director of the firm.

J. D. Todd, formerly vice president will retire to a half-time basis and remain with the company as a consultant and advisor.

R. R. Horine, who has been with the company since its organization, was made secretary.

Other company officers re-elected include **W. R. Fritsch,** vice president in charge of sales and **Sevier Bonnie, Jr.,** assistant sales manager.

INDUSTRIAL FINISHES

Dr. Miro A. Grottger has been named vice president and director of research, it has been announced.

Dr. Grottger, whose last post was director of research and development for Walker Brothers is particularly well known as the inventor of a protective-decorative coating for conduit.

Dr. Grottger will assume complete charge of all basic research and direct product research and testing for the company.

He holds a Ph.D. conferred by Chicago University's McKinley Graduate College.

Since 1928, he has worked as a chemist for several organizations. During the war, Dr. Grottger successfully worked on protective coatings for materials that were subject to extremes of temperature.

ST. JOSEPH LEAD

Charles R. Ince has been elected to the board of trustees, it has been announced.

Mr. Ince has been with the company since 1929, shortly after graduating from the Columbia School of Mines.

He became sales manager of the firm in 1948 and three years later was elected a vice president.

INLAND STEEL CONTAINER

John W. LaRocque has become manager of national sales, it has been announced.

For the past ten years Mr. LaRocque has been assistant to the vice president in charge of sales for the American Flange and Mfg. Co. He has been active in the coordination of marketing and sales with the petroleum and chemical industries throughout the world.

McCLOSKEY VARNISH

Louis R. Kenderdine III has been appointed Midwest district sales manager for the firm, it has been announced.

His responsibilities will include supervision of salesman and policy interpretation.

Mr. Kenderdine has been with the company since 1953.

J. H. DAY

Ernest E. Flowers has been named sales representative for several Midwestern states, it has been announced.

Mr. Flowers has been with the firm for nine years. Previously, he served as the company's sales and service representative in the Chicago area. He will continue using the Chicago office for his headquarters.

KADY INTERNATIONAL

Arthur W. Callahan has become general sales manager in charge of sales of the imported products of the corporation, it has been announced.

Mr. Callahan had previously been associated with the Patterson Machine and Foundry Co. and the Kinetic Dispersion Corp.

SUN CHEMICAL

Frank May has been appointed general manager of Ansbacher-Siegle Corp., recently-acquired division of the parent organization, it has been announced.

Mr. May replaces **Eric Blackstead,** who was recently elected a vice president of the corporation and general manager of its chemicals group.

Mr. May is a graduate of Rutgers University School of Chemistry. He came to Ansbacher-Siegle last year as plant manager. Prior to that he had been production superintendent of the Harmon Color Plant of B. F. Goodrich Chemical Co. He has had more than 18 years of experience in the color industry.

SAVANNAH PAINT

William V. Binder has joined the firm as technical director, it has been announced.

Mr. Binder has been in the paint industry for more than 20 years, and has had extensive experience with industrial and commercial protective coatings. He had recently been technical director of Kyanize Paints, Inc.

He attended the University of North Carolina and the Massachusetts Institute of Technology, studying Chemical Engineering with advanced courses in Colloid Chemistry. He is a member of the Federation of Paint and Varnish Production Clubs and the American Institute of Chemists.

NEWS

Hercules Postpones Project

Hercules Powder Co. has announced that it has postponed indefinitely plans to build a methacrylate plant at Louisiana, Mo.

The company announced last year that it was planning a joint venture with Imperial Chemical Industries, Ltd., of England.

A. E. Forster, president and board chairman of Hercules, said that after careful study it has been decided that the project is "currently unattractive."

Glycerine Fellowship Awarded

A $6,000 fellowship, provided by the Glycerine Producers' Association, has been awarded to Stanley Levy, a graduate assistant in Chemistry at Case Institute of Technology, Cleveland, Ohio, it has been announced.

The fellowship provides a $3,540 stipend, full tuition and expenses for the student.

Mr. Levy, a native of Cleveland, holds an M.S. degree from Brooklyn Polytechnic Institute.

Dr. T. Kieth Glennan, Case President, has announced that Mr. Levy will do research in the chemistry of glycerine's major use in resins, a field which is still not fully understood.

Rockford Paint Merges

The Rockford Paint Mfg. Co. has consolidated with the Custom Colors Corp. and the Midwest Synthetics Co. into the Rockcote Paint Co., it has been announced by Ralph J. Baudhuin, president of the new firm and formerly president of Rockford Paint Mfg. Co.

Custom Colors and Midwest Synthetics will continue to operate as subsidiaries of the new corporation, according to the announcement. The firm's headquarters are at Rockford, Ill.

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Atlanta Club Talk

J. L. Beauchamp, regional director of the Glidden Co., gave a talk at the February meeting of the Atlanta Paint, Varnish and Lacquer Association.

Mr. Beauchamp pointed out the importance of research in the paint industry and that the compounding and manufacturing of paint is no longer an art, but a true science.

He elaborated on paint prices in comparison to other commodities. Paint is the best bargain in the entire field of building materials and home furnishings, Mr. Beauchamp stated.

Competition within our industry is healthy and essential, he continued, but the future of our industry lies primarily in an unselfish attitude for the benefit of all.

•

New Division Opens

The R. J. Brown Company, a division of Ashland Oil & Refining Company and marketers of "Bronoco" brand petroleum solvents and chemicals, has announced the opening of a sales and supply division in Buffalo, New York.

Plant facilities are available to serve all petroleum solvent requirements and chemical needs of industrial users, it has also been announced.

Included in the "Bronoco" line is a complete range of aliphatic and aromatic solvents.

•

Leo Sinclair Passes

Leo Sinclair of the Sinclair Paint Company, Los Angeles, recently passed away.

Mr. Sinclair had been with the company for 12 years and during that time, travelled widely as spokesman for the firm.

To help boost your sales . . .

Canco gives nationwide TV support to Clean-Up, Paint-Up, Fix-Up promotion!

Canco's popular CBS-TV show "Douglas Edwards With The News" will help launch big annual Spring Clean-Up Campaign!

This year, Canco gives the big annual Clean-Up, Paint-Up, Fix-Up promotion the full support of nationwide TV advertising! On April 18th, millions will see a full 2½-minute commercial encouraging them to roll up their sleeves—to take part in this program by brightening up their own homes!

Canco is helping to launch this big campaign to boost sales of paint, varnish, lacquer, turpentine, solvents and related products that come in convenient Canco containers. Consumers everywhere who take pride in their homes and communities will look for these products—and for the famous Canco oval—when they buy!

Tune in Canco's CBS-TV show
"DOUGLAS EDWARDS WITH THE NEWS"
on April 18th and every Friday evening throughout this season.
Check local paper for time and channel.

AMERICAN CAN COMPANY CANCO

NEWS

Shell Chemical Builds Units

Shell Chemical Corp. is to begin construction early this year on two multimillion dollar plants at Norco, La., according to an announcement by R. C. McCurdy, Shell Chemical president.

One plant is to manufacture acrolein, and the other is to convert some of the acrolein to glycerine at an original rate of 35 million pounds per year.

Large scale availability of acrolein is expected to lead to its use as an intermediate chemical in a variety of syntheses. Volume production of the chemical was made feasible by Shell Development Co.'s discovery of the hydrogen peroxide-acrolein route to glycerine, according to Mr. McCurdy.

A plant for the manufacture of hydrogen peroxide for the new process has already been put on stream. Shell Chemical is now marketing hydrogen peroxide.

•

Elmer C. Carling Dies

Elmer C. Carling, sales manager of the American Cyanamid Co. pigments division, died recently following a short illness. He was 48 years old.

Mr. Carling was a graduate of the Newark College of Engineering. He spent his entire business career in the pigments field with Cyanamid and earlier with companies which later became parts of the American Cyanamid Co.

In 1947 Mr. Carling established an Eastern regional sales office for the pigments department, then a part of the organic chemicals division, in New York City. He became assistant sales manager of the entire pigments department in 1949, and was named sales manager of the pigments division in 1954.

Mr. Carling was a member of the New York Paint, Varnish and Lacquer Assoc.

•

New Committee To Be Formed

With the approval of the American Society for Testing Materials, a new committee on halogenated organic solvents will be organized, it has been announced.

The committee's work, says chairman M. A. Pinney, will include the promotion of knowledge pertaining to halogenated organic solvents and admixtures thereof.

The new committee will concentrate its efforts on the solvents containing halogens and solvent mixtures containing halogenated solvents, together with other types of organic solvents.

•

O. F. Shobe Named Consultant

Owen F. Shobe, formerly of the Glidden Co. paint division, has been retained as paint engineering service consultant by the Lead Industries Assoc., it has been announced by Robert L. Ziegfeld, secretary.

Mr. Shobe will be available to users of red lead and other lead-pigmented paints for consultation and advice on formulation, specification and application.

For the past 15 years Mr. Shobe has served as a member of the red lead technical committee of the Lead Industries Assoc. He is also a member of the research committee of the Steel Structures Painting Council. He is expected to continue in both capacities.

Mr. Shobe spent 39 years with the paint division of the Glidden Co., working on the formulation, testing and servicing of all kinds of paint finishes, with special reference to metal protective paints.

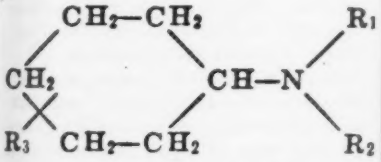
PATENTS

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired (to foreign countries $1.00 per copy) to the publisher.

Flushing Pigments

U.S. Patent 2,822,283. Bruno Blaser and Heinz Linke, Dusseldorf, Germany, assignors to Dehydag, Deutsche Hydrierwerke, G. m. b. H., Dusseldorf, Germany, a corporation of Germany.

The method of flushing pigment particles from aqueous paste form into a liquid vehicle immiscible with water to release water, which comprises agitating a mass of aqueous pigment paste with a receiving liquid vehicle which is immiscible with water in the presence of a small quantity of a substituted cyclohexylamine of the formula:



wherein R_1 and R_2 are selected from the group consisting of hydrogen and lower alkyl, and R- is lower alkyl.

Manufacture of Melamine

U.S. Patent 2,819,265. John J. Healy, Jr., St. Louis, Mo., and Colver P. Dyer, Winchester, Mass., assignors to Monsanto Chemical Co., St. Louis, Mo., a corporation of Delaware.

A process for the manufacture of melamine which comprises heating urea and from about 1 to 10% by weight, based on the weight of urea, of an ammonium halide in a pressure-resistant vessel at a temperature between about 300 and 450°C. and under a pressure of at least 600 pounds per square inch (gauge), whereby melamine is produced, and recovering the thus produced melamine.

Manufacture of Melamine

U.S. Patent 2,819,266. John J. Healy, Jr., St. Louis, Mo., and Colver P. Dyer, Winchester, Mass., assignors to Monsanto Chemical Co., St. Louis, Mo., a corporation of Delaware.

A process for the manufacture of melamine which comprises charging urea to one of two pressure-resistant reactors connected in series and charging liquid ammonia to the other reactor, heating the urea in the reactor to which it is charged to a temperature of 250°C. to 350°C. and at a pressure of 600 to 2500 pounds per square inch in the presence of ammonia from said reactor to which ammonia was charged for a period of 1 to 2.5 hours, with the longer heating period corresponding to the lower temperatures, while maintaining the reactor to which ammonia was charged at a temperature of about 90 to 115°C., whereby melamine is produced in high yield in the reactor to which urea was charged and extraneous matter collects in the other reactor, and recovering said melamine.

Fatty Oil Acid Ester

U.S. Patent 2,820,802. Cornelius Austin Sprang and Richard W. Webster, Cincinnati, Ohio, assignors to Emery Industries, Inc., Ivorydale, Ohio, a corporation of Ohio.

A plasticizer for resins which is the esterification product of (*a*) 2 mols of a fatty oil acid containing from 6 to 18 carbon atoms and (*b*) from 4 to 8 mols of a dicarboxylic acid selected from the group consisting of adipic acid and azelaic acid, with (*c*) a substantially molecular equivalent amount of a glycol selected from the group consisting of propylene glycol and dipropylene glycol.

Fire Resistant Composition

U.S. Patent 2,821,514. Donald V. Sarbach, Cuyahoga Falls, and Vernon G. Boger, Akron, Ohio, assignors to The B. F. Goodrich Co., New York, N.Y., a corporation of New York.

A composition of matter capable of forming on a base material when substantially dry an adherent, impact resistant and fire resistant coating and comprising a dispersion comprising essentially water and solids, said solids comprising as essential ingredients on a dry

weight basis from 12 to 52% by weight of at least one alkali metal silicate, from 10 to 34% by weight of a rubbery polymer of at least about 50% by weight of an open chain conjugated diene hydrocarbon having from 4 to 8 carbon atoms and from 50 to 10% by weight of a monomer selected from the group consisting of acrylonitrile, methyl acrylonitrile, ethyl acrylonitrile and chloroacrylonitrile and mixtures thereof and from 21 to 74% by weight of a refractory and said water being present in said dispersion in an amount of from 70 to 500% by weight based on the combined weights of said alkali metal silicate and said rubbery polymer.

Non-Grain-Raising Stain

U.S. Patent 2,820,712. Paul A. Blachman, Reading, Pa., assignor to The Glidden Co., Cleveland, Ohio, a corporation of Ohio.

As a novel composition, (I) an organic solvent solution of at least one complex chromium compound of a monazo dyestuff having the formula

$$[X—A—N=N—B]—(SO_2—CH_3)_z$$

wherein

A represents a benzene nucleus

B represents the radical of a member selected from the group consisting of phenolic, naphtholic and enolic coupling components, and containing an OH group in o-position to the azo group

X represents a metallizable group selected from the group consisting of OH and COOH, in o-position to the azo group, and

n is one of the integers 1 and 2, the methyl sulfone group being otherwise free from carboxylic acid and sulfonic acid groups

and (II) a binder component composed essentially of lacquer-type film-forming materials.

Bronzing Lacquer

U.S. Patent 24,414. Robert J. Stetz, Westlake, and Edmund Rogers, South Euclid, Ohio, assignors to The Engine Parts Manufacturing Co., Cleveland, Ohio, a corporation of Ohio.

A bronzing lacquer comprising a finely divided metallic pigment, a poly-alkyl acrylate lacquer base in a solvent for said lacquer base, and an amount by volume approximately equal to the foregoing ingredients of fluorochloromethane.

Opaque Water Color Paints

U.S. Patent 2,822,281. Alexander S. Masley, Albuquerque, N. Mex., assignor of thirty-three and one-third percent to Henry Heyman, Los Alamos County, N. Mex.

An artist's water paint tablet consisting essentially of (a) dry mixture of coloring pigment, whiting, acacia powder, starch powder and a non toxic organic acid capable of releasing in contact with water between about 0.02 and 0.04 equivalent of hydrogen ion for 100 g. of total dry mixture, and (*b*) a 50 percent sorbitol-water solution, the organic acid being present in an amount equal to approximately 5 cc. for each 38 parts by weight of the dry mixture and the whiting being present in an amount greater than that required to stoichiometrically combine with the organic acid present.

Film-Forming Composition

U.S. Patent 2,824,016. Ralph T.K. Cornwell, Rosemont, Pa., assignor to American Viscose Corp., Philadelphia, Pa., a corporation of Delaware.

A new composition of matter comprising (1) an organic polymeric film-forming material selected from the group consisting of thermoplastic resins, thermoplastic cellulose esters and ethers, thermosetting resins, and mixtures of thermoplastic and thermosetting resins, and (2) as a plasticizer the dipropionate of N,N′bis (beta-hydroxyethyl) terephthalamide.

Acrylic Acid Derivatives of Epoxide Resins

U.S. Patent 2,824,851. Myron W. Hall, St. Paul, Minn., assignor to Minnesota Mining & Manufacturing Co., St. Paul, Minn., a corporation of Delaware.

A composition of matter in liquid form free of volatile vehicle and consisting essentially of (*a*) at least one glycidyl ether of a hydroxy compound of the class consisting of phenol, polyhydric phenols, and polyhydric aliphatic alcohols, said glycidyl ether having at least one epoxy radical per molecule, (*b*) at least one liquid organic carboxylic acid of the class consisting of acrylic acid and methacrylic acid, and (*c*) an amine catalyst; the ratio of epoxy radicals to carboxyl radicals being about 1:1 to about 4:1, and the weight of amine catalyst being about 0.01-7.0 percent of the weight of said glycidyl ether.

ELECTRICAL CHARGE

(*From page 51*)

been added to oil paints as leveling agents. Experience has known that these leveling agents are effective only if zinc white or zinc oxide are used.

Experiments showed that formulations with benzoic acid and with crotonic acid differed from formulations without them, in that zinc white changed its electrical charge from negative to positive. Rutile and red lead showed the same phenomena to a lesser degree, while lead cyanamide and red iron oxide remained unchanged. Toluidine yellow retained its original negative charge. If 10% of zinc white is added to red iron oxide, then crotonic acid changes the negative charge on the pigments to a positive charge causing iron oxide moves towards the cathode.

An explanation might be that the acids react with the basic zinc oxide or zinc white to form a surfactant soap, which influences the electrical charge in a particular way. However butyric acid does not react like crotonic and benzoic acid. Whether the particular effect of these acids depends on their dissociation constants or typical absorption properties of their zinc salts is still unknown. The flow characteristics of zinc pigmented paints with crotonic and benzoic acid differs in a typical way from the paints with uncharged pigments. The plastic viscosity curve is much steeper for the paint with crotonic acid than for the paint with butyric acid and the paint without additives.

Electron microscopic studies have confirmed the relation between dispersion of the pigments and their electrical charge.

It is a known practice that the gloss of paint may be improved by adding another binder to the formula, e.g., nitrocellulose with an alkyd resin. In this case the alkyd resin acts as a wetting agent and gives a positive charge to the pigment particles.

Hiding

Paints with equal pigment volume concentration but with different binders showed a difference in hiding up to 20%. As the electrical charge of pigments improves the dispersion, it is easy to obtain maximum hiding by selecting the appropriate wetting agent.

Summary

The results of these experiments correlating the electrical charge of pigments in solutions with binders show that:

1. Inorganic pigments are positively or negatively charged or neutral, depending on the suspension medium.
2. Organic pigments have a specific charge which is independent of the medium.
3. Addition of wetting and flow agents can change the electrical charge of inorganic pigments, if an appropriate binder is selected. However the electrical charge of organic pigments cannot be changed.
   Some binders act as wetting agents.
4. There is an intimate relation between the charge and the dispersion of pigments. Therefore, there exists a relation between the electrical charge of the pigments and the hiding, gloss, flow, brushability, and critical pigment volume of systems containing these pigments.

(*From page 38*)

using a calibrated ocular lens. When the diameters of the average floc size were plotted in microns versus the logarithm of time, the curves of (Figure No. 7) were obtained. Curve A for the new flocculation resistant pigment, appearing at the bottom of the figure is a straight line with practically a zero slope, indicating no apparent floc formation. The curve of the flocculating pigment (C) indicates rapid floc growth to sizes which seriously impair pigment strength. Curve B is an example of a typical "flocculation resistant "type prepared by one of the earlier methods. From these curves it can be seen that the smaller the slope, the better the flocculation resistance of the pigment. From the "R_s" values obtained from panels of these same lacquers it is evident that the results of this microscopic method agree with those obtained in a practical flocculation test using a tinted lacquer.

Acknowledgment

We wish to thank the American Cyanamid Company for permission to publish this paper and to acknowledge the excellent cooperation received from the personnel in the various laboratories of the Company.

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abstracts

The following are abstracts of papers presented at the September 8-13 meeting of the American Chemical Society, Division of Paint, Plastics and Printing Ink Chemistry, in New York, N. Y.

High-Energy Radiation Effects on Polyacrylics

By Allan R. Shultz, Central Research Department, Minnesota Mining and Manufacturing Co.

A sufficient amount of physical and chemical data has accumulated to allow a tentative description of chemical changes produced in polyacrylates and polymethacrylates subjected in bulk to ionizing radiations. These polymers represent, respectively, the predominantly cross linking and the predominantly main-chain scissioning classes of macromolecules. Enumeration of cross linkages and chain fractures is accomplished by measuring molecular weight changes, infinite network formation and growth. network swelling, and the alteration of diluse solution viscosity behavior. Energy consumption during cross-link formation and backbone scissioning is obtained by coupling thc above measurements with radiation dose information.

Magnetic resonance study, post-irradiation chemical activity, and the effect of chemical additives indicate the presence of some long-lived free-radical species in irradiated solid poly(methyl methacrylate). Mass spectra of gases evolved from poly(methyl methacrylate) reveal degradation products having essentially thc empirical composition of the poly(methyl methacrylate) side chain. A 1,4-diradical formation and decomposition (or an analogous concerted mechanism) is postulated as the prin.lpal mechanism by which a side-choin breakup and main-chain scission occur simultaneously.

Less attention has been given to polyacrylate response to ionizing radiations. Network formation analysis has permitted determination of energy consumption during cross-link formation for a few members of this series. In contrast to the possible simplicity of the principal poly-methacrylate scissioning mechanism, cross linking of polyacrylates must involve two or more consecutive free-radical steps. The structure-reactivity relations of probably free-radical intermediates may be the clue to cross-linking efficiency variation among isomeric alkyl polyacrylates.

Ionizing Radiation as an Initiator for Polymerization

By D. S. Ballantine, Brookhaven National Laboratory, Upton, N. Y.

Ionizing radiation interacts with organic molecules to produce ionization and electronic excitation. The ions and excited molecules produced by these primary processes can further give rise to free radicals by charge neutralization and molecular decomposition. Numerous investigations have shown that while these ionizing radiations produce ions, excited molecules, and free radicals, only reactions which are known to proceed by free-radical mechanisms are affected. Thus in the area of polymers the polycondensation polymerization and vinyl polymerizations which proceed by ionic schemes are not catalyzed by ionizing radiations but there is a great amount of data on free radical vinyl polymerizations initiated by gamma, x, beta, and electron radiation.

In the accepted vinyl polymerization schemes, involving the various steps

of initiation, propagation, termination, and transfer, only the initiation and transfer steps are affected by radiation. Polymers produced by radiation techniques are by the nature of the radiation-initiated process more branched than polymers produced with more conventional initiators such as heat, peroxides, or ultraviolet light. Radiation would appear to have several potential advantages over these more conventional initiators because the initiation step is temperature independent, the initiator is completely external to the reaction system, reactions have been conducted in the solid state, and normally high pressure reactions have been initiated at significantly lower pressures.

This review covers significant work in this field to date and includes a discussion of the curing of various polyesters formulations by radiation and the potential advantages which such a system may offer.

Curing of Furfural- Phenol Resins

By Lloyd H. Brown and David D. Watson, Chemicals Department, The Quaker Oats Co., Barrington, Ill.

Furfural-phenol resins have previously been used in applications which require long flow, because they cure more slowly than phenol-formaldehyde sesins. However, rapid cures are derirable for most applications.

The effects of manufacturing variables, including procedure, amount and type of catalyst, reaction temperature, and ratio of furfural to phenol are described. Effects of resin melting point, pH, and unreacted materials are shown. Furfural-phenol resins compounded with boric acid and hexamethylenetetramine cure as rapidly as general-purpose phenol-formaldehyde compounds. All of the properties of the cured materials except flexural strength are within specifications for general-purpose phenolics.

Radiation Chemistry of Polyethylene

By A. A. Miller and E. J. Lawton, General Electric Resedrch Laboratory.

This paper reviews the effects of ionizing radiation on hydrocarbon polymers of the polyethylene type, with emphasis on the radiation chemistry of these systems. The major part is based on published work on high-pressure, low-density polyethylene, but some recent results on the newer, high-density material are mentioned.

When low-density, branched polyethylene is exposed to ionizing radiation the major processes are the cross linking of the polymer chains with the evolution of hydrogen and volatile hydrocarbons, the latter arising from the cleavage of the short branches in the polymer. A concurrent reaction is the production of internal (*trans*-vinylene) unsaturation and some indirect evidence is presented that this is a molecular process, independent of the cross-linking reaction, which appears to be largely a free radical process. In the presence of oxygen the over-all cross-linking efficiency can be reduced to the point where oxidative degradation of the polymer chains, rather than cross linking, predominates. This becomes important at very low radiation intensities. Evidence for this oxidation is the appearance of carbonyl at 5.8 microns in the infrared spectrum of irradiated polyehtylene.

Recent results on highly crystalline, unbranched polyethylene, such as polymethylene or Phillips' Marlex-50, show that vinylene unsaturation is produced in about the same yield as in ordinary polyethylene. Also, polymer radicals are formed by C-H scission. However, these polymer radicals are trapped in the crystalline matrix and do not cross link until the crystallinity is destroyed by heating following irradiation. If the irradiated material is exposed to air prior to annealing, the trapped radicals slowly react with oxygen, ultimately forming carbonyl groups, rather than cross linking.

The following are abstracts of papers presented at the 35th Annual Meeting of the Federation of Paint and Varnish Production Clubs in Philadelphia, Pa., Oct. 30-Nov. 2, 1957.

Instrumental Color Reproduction of Paint

By Baltimore Paint and Varnish Production Club.

One of the selling points made for color measuring instruments is that, with them, color standards which have been lost or which have changed with time can be reproduced as they were originally, using measurements made on the original standard. Although this claim has been made for many of the available color measuring instruments, there was no evidence known to support it. It seemed desirable to determine the precision with which this could be done and, insofar as possible, to determine whether there was any marked choice among the available instruments in their ability to recover a lost color.

The conclusions reached were as follows:

1. Color-measuring instruments are able to do an excellent job with non-metameric colors in reproducing color standards from measurements taken some time previously.

2. There does not appear to be any significant difference between instruments in precision. What difference there is lies in convenience and ease of interpretation of results. This depends

in large measure, on how much practice an operator has had with a given machine.

3. In selecting the "best" match from a set of chips, the instruments do very well in the range above 1 NBS unit. In this range, visual judgments are unequivocal. With smaller differences, results show some scatter, but so do visual judgments. In general, the performance of the instruments based on number values alone without a standard available for comparison, is about as precise as is visual judgment with the standard available.

4. In tinting to match a standard, the limiting factor appears to be the patience and experience of the operator rather than the precision of the particular instrument used to check his results.

5. No information is available as to the type of match which would be obtained by one instrument against a standard measured on another instrument, but this would be expected to be less accurate.

6. The ability of instruments to match standards that have been lost, or have changed, is about as good as is the ability of a trained color matcher to match them by direct comparison.

Solubility Parameters of Resins

By C.D.I.C. Paint and Varnish Production Club.

The problem of selecting the best solvent combinations for a given coating formulation is one which requires the time and attention of many chemists. The normal mode of operation is one of trial and error, sometimes guided by the concepts of "like dissolves like", or polarity. The inefficacy of these guides is well recognized by formulators, and has often been demonstrated. Fortunately, a scientific method is now available by which paint chemists can make a logical selection of solvents for a given job. This is based on the concept of solubility parameter.

The detailed background of this method was discussed extensively in the *Official Digest* for October 1955, page 726. At that time it was shown that solubility parameter can take the guess work out of choosing solvents and save a great deal of time. It can help to solve many of the perplexing problems which frequently occur in paint formulating. It also explains many of the unusual and anomalous results which are familiar to most of us. Not the least important aspect is the confidence inspired in the user, that he has made the best possible solvent choice. As a corollary, if a given problem is not solved by selection according to the solubility parameter, then no solvent change will help.

The idea in back of solubility parameter is a very simple one. If the value for a given liquid is the same as that as of the film former, the liquid will be a solvent for the film former. Fortunately, these values do not have to be matched exactly, and that is why the value for a film former is given as a range. Any solvent having a value within the designated range would be a solvent for that particular resin.

Evaluation of Dry Spackling Compounds for Interior Walls

By New York Paint and Varnish Production Club.

The evaluation of dry spackling compounds was considered of interest to paint chemists who must formulate paints for use over patched plaster walls. This study was undertaken in three ways: first, the study of a practical method of test designed to simulate actual working conditions; second, a study of compounds cast in a mold, and third, the use of punched panels affixed to a single backing.

The conclusions reached were as follows:

1. Successful results in patching interior wall surfaces are highly dependent upon the skill of the operator.

2. Variations in application technique among the participants in this study have a much greater effect on the appearance of the patch, than does the quality of any of the spackling compounds tested. One or two skilled operators can produce a good patch regardless of the compound used, while other operators could not produce a good patch with any compound.

3. It has not been found possible, with the methods described here, to devise a

test that is practical, yet which will sufficiently eliminate the element of individual skill to permit its use as a reproducible laboratory test.

Development of Flat Wall Paint Scrubbability Method

By New York Paint and Varnish Production Club.

Reports and investigations within the paint industry indicated that several problems existed in determining the scrubbability of flat wall paints, namely:

1. The present methods to determine these properties were highly controversial.
2. Present specifications and existing test methods were not adequate to detect quality and were difficult to duplicate with reliability.
3. Scrubbability had to be differentiated from stain removal and studied as a distinct problem.

The result has been the development, in various laboratories, of individual test methods, based upon empirical procedures, and suited to individual needs.

A reflectance reading of the film is obtained before scrubbing and the panel is then clamped in the Gardner Straight Line Washability Machine. The diaper cloth, which has been cut 2" wide x 18" long, and folded to four thicknesses with the fine weave down, is clamped onto the abrasion boat attachment. The diaper cloth is wet with 5cc of water, and the panel is washed for 50 cycles to remove any surface dirt. The panel is rinsed under tap water, dried in an oven at 100° F for five minutes to ensure rapid evaporation of the water, and the reflectance of the film is measured.

Two grams of cleaning compound, composed of silica and quartz are applied evenly with a spatula over the diaper cloth. The panel is scrubbed for 100 cycles reversing the boat at 50 cycles, then rinsed under tap water and dried in the oven at 100°F for five minutes, and the reflectance is measured.

The log of the reflectance of the two film thicknesses investigated is plotted against the number of scrub cycles. In properly operated procedures, these points connect to make a straight line, and the slopes of these lines are easily determined. The slopes, in turn, are extrapolated to a common film thickness. Where the line crosses 85% reflectance (an arbitrary point), the slope value is identified. This figure can be interpreted as the scrub resistance of the film.

The committee feels that although several areas of the test procedure require improvements, the technique and relationships mentioned will be of value to the individual operator interested in making relative product comparisons. However, additional work will be done toward the simplification of the test procedures, and standardization of equipment between labs. Caution should be observed in the interpretation of results, particularly as regards the arbitrary end point. Further studies will also be required on colored or tinted films.

Anti-Rust Additives In Paint Primers

By Golden Gate Paint and Varnish Production Club.

For some time there has been a theory that the rust inhibiting properties of various paint products could be improved by the addition of certain chemical compounds. The problem here was to select several practical primers and make the addition of these various compounds. The resulting films could then be checked for rust retarding effects through the use of the salt spray cabinet as a testing device.

The conclusions reached were as follows:

1. As a whole, the tests indicate that increasing film thickness increased metal protection. This was not a primary objective, but since this is evident, it is noted in passing.
2. While film thickness is a contributing factor, the use of additives is in some instances of greater value. This is particularly true in that the additive will improve the protection in a certain direction. Thus one additive may help rust creepage greatly, but increase rusting somewhat. On the overall protection picture, the additive is of definite value.
3. In some instances, the additive is actually harmful. The film is more prone to fail with the rust inhibitor

added than before.

4. In both series of results it was emphatically shown that primers made with the classic rust inhibitiing pigments such as red lead and/or zinc chromate show a definite degree of protection. Paints made with neither of these pigments available show complete failure after 300 hours in the salt spray cabinet.

5. Although none of the additives that were tested showed to be outstanding in every series, two of the compounds could be rated as contributing to all the protective films. These two additives are Hercules HX-N-RA-50A and Proprietary Brand B.

All these tests are based on salt spray exposures. Whether these same conclusions could be derived on an actual atmosphere exposure is to be seen. However, by comparing the control panels of the standard formulas with the known exposure data, we feel the results are valid. The salt spray test appears indicative of actual exposure results.

Artificial Illumination for Matching of Colors

By Philadelphia Paint and Varnish Production Club.

Two specific objectives were sought in this study. First to select optimum source of artificial illumination for the matching of colors under plant production conditions. Second, to select optimum source of artificial illumination for the matching of colors under all conditions to include consideration of metameric matches.

Efforts were made to assemble in one place as many different types of color matching lamps as could be practically grouped together. Seven light sources were collected and set up, and although this did not include all known sources, it did represent a good cross-section of the types available to the paint industry.

After long and careful study of the artificial light sources and viewing conditions, the conclusions were as follows:

1. For production control within the practical limits of illumination intensity and reasonable dispersion of light intensity of the color spectrum range, any source of light can be used successfully to match color as long as pigments present are similar in composition.

2. Multiple light sources are required to establish an all-purpose viewing condition to match colors when pigments present are metameric. This involves two light sources of different color temperature with the provision that colors would be matched under one set of conditions (Kelvin 7500°) and then verified for agreement at another condition (Kelvin 2800°) or similar contrasting conditions.

Description and Evaluation of K. C. Club Sag Tester

By Kansas City Paint and Varnish Production Club.

One of the most vexing problems confronting the formulator or the control technician is the evaluation or judgment of day-to-day variation in flow properties of architectural finishes.

Most control procedures on trade sales paints and enamels include some form of test designed to show resistance to sagging or running. Methods vary, but probably nine out of ten painters run a wavy "sag-line" with the end of the brush handle. Their opinion is formed by the way the paint flows or does not flow across this line.

None of the tests heretofore proposed can be considered as other than qualitative or, at best, very roughly quantitative. Furthermore, excessive sagging or running may or may not be indicated by these tests. It is also difficult to set up definite standards to which factory batches are required to conform.

The Kansas City Production Club Sag Tester is a simple device intended only as a means of evaluating relative flow between various batches or productions of the same paint or between two or more competitive paints up for comparison, or for evaluating the effectiveness of the many flow control agents which are on the market. It is only in this light that this Sag Tester can and should be viewed.

The apparatus used in the Kansas City Sag Test consists of:

1. A metal cube approximately one inch on all sides with a ¾" hole bored through one side. On the edge connecting with this hole is a channel, in

this case 10 mils deep. This cube is essentially a doctor blade laying down a wet film approximately 5 mils in thickness. Other dimensions of the cut are possible allowing greater flexibility for the use of this test. This cube had its origin in the Reichhold Dry Time Recorder and can be purchased on special order from Eastern Precision Gage Company. Be sure and specify the cut desired.

2. A Morest Form SFT, 8½ x 11. Please note this is an area for light or dark paints.

3. A straight edge preferably with a metal inset to reduce the possibility of friction.

4. A plane surface such as a piece of plate glass. A suction plate may be used but it is not absolutely essential.

The Morest Chart SFT is placed on a plane surface, The straight edge is aligned with the proper straight edge guide. (This is determined by the fact that the paint to be tested is either light or dark to insure proper contrast). At this point, the Kansas City Production Club Sag Tester (metal cube) is placed on the proper end of the chart and filled with enough paint to insure a complete drawdown. Thc Sag Tester is gripped firmly with the fingers as is the straight edge and a uniform rate of withdrawal is applied. The Sag Tester can be drawn completely over the edge of the Morest Chart onto a scrap piece of paper, eliminating the need of a wipe-up except on the sag tester. The Morest Chart SFT is then hung immediately in a vertical position with the drawdown in a horizontal position.

Study of Pigment Dispersion: VI Phthalocyanine Blue

By New York Paint and Varnish Production Club.

The subcommittee selected an unmodified phthalocyanine blue toner for study, since phthalocyanine blue being almost black in masstone is used entirely for its tinctorial value. Therefore it was regarded as a highly logical selection for proof of the principle that the efficiency of dispersing color pigments can be acutely measured by evaluation of developed tinting strength. Because of its well known tendency to aggregate, and to require extensive effort for adequate strength and fineness development, phthalocyanine blue seemed particularly adaptable to the purpose. Mixer/roller mill procedure, and steel ball mill grinding were selected as dispersion methods, since past work had developed optimum procedures for this equipment, and also since both tools could produce high pigment concentration pastes adaptable to the practical requirements of a base tinting paste.

Hence, the statement of objective became: "To determine, for phthalocyanine blue toner, the principles of dispersion procedure productive of the highest efficiency in terms of:

1. Economics of operation
2. Mechanical ease of handling
3. Tinctorial strength
4. Stability in admixture with a titanium dioxide tinting base."

The following conclusions are considered to have far-reaching significance in the practical utilization of fine particle, tinctorially strong color pigments:

1. There is a practical minimum amount of dispersion work, or investment, which provides the optimum economic return from use of phthalocyanine blue for tinctorial purposes.

2. The practical work minimum is not necessarily recognized by gauge measurement of grind fineness, but is best measured by appropriate tint strength evaluation.

3. Tint strength evaluation is reliable only if the principles necessary to a broad pigment to vehicle solids to volatile compatibility are recognized and applied.

4. In addition to good compatibility practice, it has been established that good mechanical procedure for blending color base and white is essential if the full strength of the dispersion is to be realized and retained.

5. Although the equipment for dispersing color pigment is a matter of choice, the evidence obtained indicates a short run in the steel ball mill at high loading is the most economical procedure, and which further offers considerable latitude in ease of handling.

6. Much can be gained in developing

practical knowledge of the consistency characteristics of both the color base paste and the white tinting base. Such information aids design of the best incorporation procedure. Although not extensively explored, this is definitely a primary factor, and may become the subject of a future study.

7. Pigmented systems are recognized as complex when the number of pigments exceeds one and the number of liquid components exceeds one. Thus a tint comprising a mixture of two pigments is complex even in a supposedly simple vehicle. The "simple" vehicle itself, whether it be ordinary linseed oil or a 100% solids alkyd resin, is now recognized as a complex mixture of esters, and even the commonly used volatile materials are now seen to be complex mixtures.

The interplay of these complex vehicle systems in their relationships to pigments which strongly differ by being hydrophilic as opposed to organophilic, insoluble as against soluble, etc., comprises a broad new field of technology where appropriate experimentation and interpretation of basic principles will considerably advance paint science.

Color Stability of Red Iron Oxide Pigments

By Philadelphia Paint and Varnish Production Club.

Medium oil alkyd enamels pigmented with all of the various types of red iron oxide pigments were exposed to determine their color stability. In this work, the iron oxide content was not kept constant, but was allowed to fall where it might, because it was felt that the extender portion of the oxides in venetian reds and natural iron oxide products would be more intimately dispersed with the iron oxide portion, than it would be in a mechanical mix.

Both light and dark shades were used, where available, because color in oxide pigments is a function of particle size, and this effect on color stability constituted a part of the study. Also included was a "jet milled" Spanish oxide, to evaluate the effect of this type of milling.

Included in this evaluation work were such pigments as the following: Persian Gulf oxide, dark and light Venetian red, light and dark precipitated iron oxide, light and dark Ferrite iron oxide, light and dark copper as red iron oxide, Spanish red oxide, and the "Jet Milled" Spanish oxide. Exposures were made in single pigment enamels and in blends with titanium dioxide enamel.

The results show that in so far as color stability is concerned, any of the iron oxides can be used. None of the oxides used in this study had any adverse effect on film durability, since all were equal at the end of three years. Such other factors as mass tone, tone on reduction, ease of dispersion, tinting strength, cost, etc., will largely determine what red iron oxide should be used in any given formulation.

A Solvent Formulating Chart

By Harry Burrell. A Roon Award Competition paper.

This paper shows how a chart can be constructed which will present at a glance all of the pertinent data which must be considered when choosing a solvent for a given formulation. The scientific basis of solvency is reviewed from the solubility parameter concept. It is shown that solution viscosity is dependent on solvent viscosity. Formulation viscosity may be varied at will by proper solvent selection. Other factors which must be considered are also reviewed. Several examples are given which show how the chart can be used to solve practical problems quickly and easily, with considerable saving of man-hours.

Carothers Equation for Condensation Polymerization

By R. F. Carmody. A Roon Award Competition paper.

The equation derived by Carothers to mathematically express the conditions of condensation polymerization has not found extensive practical use. The equation as stated does not consider deviations from ideal polymerization conditions. Pract cal alkyd formulations vary from these ideal conditions because of a variety of reactions competing with those concerned in the

study of Carothers. Dimerization of fatty acids to dibasic acids, etherification of polyols, intra-ester formation and the esterification rates of primary and secondary hydroxyl groups are the most obviously ignored competing reactions.

A correction factor, experimentally determined, may be used to extend the usefulness of the Carothers equation. The application of the factor enables the formulation of any alkyd system with a mathematical certainty of success. Since the trend in alkyd resins is to harder, faster curing systems of high functionality considerable application for correction factors is envisioned.

The extension of this method to polyurethane and systems of simultaneous addition and condensation polymerization appears to offer an interesting area for development.

Effect of Solvents On Viscosity of Alkyd Solutions

By W. W. Reynolds and H. J. Gebhart, Jr. A Roon Award Competition paper.

There is no simple relation between solution viscosity and solvent power for blends of soya-oil alkyd resins and hydrocarbon solvents. For the long oil alkyds, solvent viscosity is much more indicative of the viscosity-reduction ability of a solvent than either solvent power or hydrocarbon type. Equations based on the Huggins equation were developed to summarize this relationship. Knowing the solvent viscosity and the resin concentration, the solution viscosity can be predicted within an error of 10% up to a concentration of 30 grams of resin per 100 ml of solution. At higher concentrations the effect of solvent power and hydrocarbon type becomes a significant factor in determining solution viscosity. The concentration dependence of the relative viscosity of one of the long oil alkyd resins studied is accurately described by the Burgers-Saito equation developed for a suspension of spherical particles, which suggests that the resin exists as spherical aggregates.

Results of a similar analysis of blends of the short oil alkyd with various naphthenic and aromatic hydrocarbons and with several commercial solvents of widely different hydrocarbon composition show that solvent power is the predominant factor in determining the viscosity-reduction ability of solvents for the short oil alkyds. Resin-thinner blends of the short oil alkyd with poor solvents are extremely viscous, indicating a high degree of aggregation among the resin molecules. The effect of solvent power and hydrocarbon type is most pronounced at high concentrations where there is a greater tendency to form aggregates.

Hexylene Glycol in Styrene-Butadiene Latex Paint

By Roy W. Tess and Robert D. Schmitz. A Roon Award Competition paper.

Primarily in an effort to improve levelling properties, four solvents have been investigated for use in both alkyd modified and straight styrene-butadiene latex paints. In application tests using brush and roller-coaters, hexylene glycol was found to considerably improve levelling when used at 20% based on vehicle content (about 0.4 pound of solvent per gallon of paint). "Cellosolve" and diacetone alcohol improved levelling moderately in some compositions, but ethylene glycol was essentially ineffective and even made levelling worse in some cases. Hexylene glycol slowed the drying rate slightly but hardness was not adversely affected.

A further detailed investigation was conducted of paints at a variety of pigment volume concentrations (30-45%) and at various levels of hexylene glycol content (0, 20, 40% based on alkyd-latex vehicle). The beneficial effect of this solvent on levelling was confirmed in all paints. Moreover, the improved levelling was accompanied by better flexibility, improved scrubbability in some cases, and especially at high PVC, by better cleansability. At the same time, no adverse effects upon other paint properties were observed, except that excessive quantities of solvent resulted in a decrease of hiding power.

The inclusion of hexylene glycol in latex paint permits the formulation of paint at high PVC. Compared to paint at lower PVC, the following advantages result: improved scrub resistance, less yellowing, greater flatness, better hiding, cheaper cost per pound of solids and higher non-volatile content. The usual disadvantages of high PVC, poor cleansability and poor levelling, are overcome by use of the solvent.

A study of paints at 45% PVC by means of the electron microscope has shown that film fusion and surface smoothness of the paints were promoted to a considerable extent by the inclusion of hexylene glycol in the paints.

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Correction

On page 46 of our February issue, mention was made that ethyl alcohol can be obtained on a contract basis for 25 to 35 cents per gallon. It has been brought to our attention by leading suppliers of this material that the prevailing price of ethyl alcohol today is approximately 50 cents per gallon.

CALENDAR OF EVENTS

April 13-16. ACS Spring Meeting, Div. of Paint, Plastics and Printing Ink Chemistry, San Francisco, Calif.

May 1-3. Southwestern Paint Convention and Raw Material Exhibit, Statler-Hilton Hotel, Dallas, Tex.

May 9-10. Annual symposium of the Pacific Northwest Paint and Varnish Production Club, Hotel Georgia, Vancouver, B. C., Canada.

Production Club Meetings

Baltimore, 2nd Friday, Park Plaza Hotel

Chicago, 1st Monday, Furniture Mart.

C.D.I.C., 2nd Monday.
Cincinnati — Oct., Dec., Mar., May, Hotel Alms.
Dayton — Nov., Feb., April, Suttmilers.
Columbus — Jan., June, Sept., Fort Hayes Hotel.

Cleveland, 3rd Friday, Harvey Restaurant.

Dallas, 1st Thursday after 2nd Monday, Melrose Hotel.

Detroit, 4th Tuesday, Rackham Building.

Golden Gate, 3rd Monday, Sabella's Restaurant, San Francisco.

Houston, Monday prior 2nd Tuesday, Ship Ahoy Restaurant.

Kansas City, 2nd Thursday, Pickwick Hotel.

Los Angeles, 2nd Wednesday, Scully's Cafe.

Louisville, 3rd Wednesday, Seelbach Hotel.

Montreal, 1st Wednesday, Queen's Hotel.

New England, 3rd Thursday, University Club, Boston.

New York, 1st Thursday, Brass Rail, 100 Park Ave.

Northwestern, 1st Friday, St. Paul Town and Country Club.

Pacific Northwest, 3rd Thursday, Washington Athletic Club, Seattle, Wash.

Philadelphia, 3rd Wednesday, Philadelphia Rifle Club.

Pittsburgh, 1st Monday, Gateway Plaza, Bldg. 2.

Rocky Mountain, 2nd Wednesday, Republican Club, Denver, Colo.

St. Louis, 3rd Tuesday, Kings-Way Hotel.

Southern, Annual Meetings Only.

Toronto, 3rd Monday, Oak Room, Union Station.

Western New York, 1st Monday, 40-8 Club, Buffalo.

TECHNICAL Bulletins

PROTECTION OF RECORDS

Booklet SC-798 may be obtained from The Remington Rand Division of Sperry Rand Corp., Dept. PVP, 315 Fourth Ave., New York 10, N. Y.

The new booklet describes various features and combinations of locking arrangements adaptable in the firm's safe-file unit line.

Businessmen should consider that while fire is the greatest single hazard facing business records, prying eyes and possibility of theft are also factors that require the utmost protective caution.

PAINT & VARNISH REMOVERS

The intricacies of paint and varnish removers are outlined in a new paper.

The report lists and briefly describes the characteristics of materials used in removers, including the solvents, activators and thickeners. Typical formulations are given, as well as instructions for testing the efficiencies of various solvents.

The report is available without cost. Stauffer Chemical Co., Dept. PVP, 380 Madison Ave., New York 17, N. Y.

THERMOCOUPLE

Buyers' guide G100-8 now available from Minneapolis-Honeywell Regulator Co, Industrial Division, Dept. PVP, Wayne and Windrim Aves., Philadelphia 44, Pa.

The guide describes the firm's complete line of thermocouple accesories for measuring temperature.

The 52-page guide contains illustrations, diagrams, charts, and sections devoted to general information.

DIAL THERMOMETER

Catalog No. 225C describing Moeller Bimet Dial Thermometers now available from Moeller Instrument Co., Dept. PVP, Richmond Hill 18, N. Y.

Fully-illustrated booklet contains diagrams and copy explaining the features of the thermometer.

ALUMINUM PRODUCTS LIST

An aluminum products sheet describing 17 standard grades of aluminum powder the firm currently offers is now available. Atomized, granular, leafing and non-leafing flaked powders are included among the products listed.

Also available is an aluminum application sheet which is designed for customer use.

Hummel Chemical Co., Inc., Dept. PVP, Ninety West St., New York 6, N. Y.

FRAME ASSIGNMENTS

"Compar-A-Frame" bulletin B-1284-1 is available from the Reliance Electric & Engineering Co., Dept. PVP, 24701 Euclid Ave., Cleveland 17, Ohio.

Booklet gives NEMA frame assignments and overall dimensions of the firm's a-c. motors in new frame sizes from 364U to 445U. Also explained is how to quickly compare dimensions of the series "C" motors with those of the series "D" line.

EMULSION PAINTS

Bulletin 62a, dealing with emulsion paints, is now available from the Raybo Chemical Co., Dept. PVP, Huntington, W. Va.

The bulletin discusses ways of improving various properties of emulsion paints. Such properties

include adhesion, water resistance, hiding power and pigment suspension.

COLOR MATCHING & CONTROL

A 4-page bulletin outlining the requirements of the "New Graphic Arts Standard" for lighting for color matching and color quality control within the graphic arts industry is now available.

The booklet, No. 274, contains pictures, diagrams and general information on lighting equipment.

Dept. P. Macbeth Daylighting Corp., Dept. PVP, Newburgh, N. Y.

TESTING INSTRUMENTS

A 112-page catalog is now available, without charge, from Gardner Laboratory Inc., Dept. PVP, P.O. Box 5728, Bethesda, 14, Md.

The catalog describes the testing instruments available for paint and other materials.

Also available are descriptive leaflets describing new developments subsequent to the catalog's publication.

SILICONE INTERMEDIATES

Data sheets giving information on the firms silicone intermediates and particularly Z-6018 are now available.

Dow Corning Corp., Dept. PVP, Midland, Mich.

CONFERENCE PROCEEEINGS

"Proceedings of the President's Conference on Technical and Distribution Reasearch for the Benefit of Small Business" is now available at $2.50 per copy from the Office of Technical Servies, U. S. Department of Commerce, Washington 25, D. C.

The 297-page book, PB 131460, concerns the conference called by President Eisenhower last September which was attended by 1,000 representatives of small and large business.

The proceedings constitute a small businessman's guide as to research assistance that he may receive to improve his products and increase sales and profits.

PIGMENT MIXING

A four-page reprinted article offered by Gifford-Wood Co., Dept. PVP, Hudson, N. Y., tells how Paragon Paint & Varnish Corp. cut pigment mixing time by 30%.

Seven illustrations showing contrast between firm's old and new methods of mixing are included. Savings, principles of operation and use of a homomixer are explained.

SAFETY CODE

A six-page brochure on "Safety Code for Inspection, Maintenance and Protection of Fixed Foam Systems" is now available, without cost, from the Fire Equipment Manufacturers' Assn., Inc., Suite 579, Dept. PVP, One Gateway Center, Pittsburgh 22. Pa.

The brochure outlines the three most popular types of foam systems now in use—chemical foam, indoor foam and outdoor foam.

This safety code covers such procedures as recharging, pipe drainage and hydrostatic testing.

SILICONES

The 1958 Guide to Dow Corning Silicones has been announced by the Dow Corning Corp., Dept. PVP, Midland, Mich.

The 16-page catalog covers de foamers, paint resins, paint addi

ives, varnishes and other materials. The catalog is fully-illustrated with photographs, charts and able.

PUMP STRAINERS

A two-color catalog describing the "Ezy-Kleen" strainer line has been prepared by the Blackmer Pump Co., Dept. PVP, Grand Rapids 9, Mich.

The catalog utilizes cutaway and installation pictures to point out construction features and operation of the strainers. Also included is a selection chart for determination of the proper strainer model, based on pump size, liquid flow and pipe size.

Also contained in the catalog, which is designated Bulletin No. 400, is a basket selection table indicating available perforation grades and basket construction materials.

DISPERSION MILLS

Bulletin No. 1057 containing complete data on a line of "Hy-R-Speed Mills" for grinding, dispersing and blending has been released by The J. H. Day Co., Division of The Cleveland Automatic Machine Co., Dept. PVP, 4932 Beech St., Cincinnati 12, Ohio.

Main operating parts of the equipment are illustrated and construction features and specifications are given on three mill sizes with capacities of 150-300, 100-200 and 10-20 gallons per hour.

TITRATION ADAPTER

A six-page bulletin on a colorimetric titration adapter for "Lumetron" Photoelectric Colorimeter Model 401 has been made available by Photovolt Corp., Dept. PVP, 95 Madison Ave., New York 16, N.Y.

Designated Bulletin No. 355, the publicaiion covers the advantages of photoelectric titration techniques, applications for the equipment, operation of the equipment and an illustrated description of the adapter.

METERING PUMP

Bulletin No. 1157 describing a metering pump with diaphragm liquid end has been released by Milton Roy Co., Dept PVP, 1300 E. Mermaid Lane, Philadelphia 18, Pa.

The two-page bulletin specifies capacities, pressures and materials of construction of the leakproof pump for metering corrosive, obnoxious or toxic chemicals. It also describes design features and applications.

THERMOMETERS

Catalog 060-2 describing a complete line of Brown rectangular case filled system thermometers has been made available by Minneapolis-Honeywell Regulator Co., Industrial Division, Dept. PVP, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Indicators, recorders, transmitters and electric or pneumatic control instruments are covered in detail in the 56-page catalog. Also covered are vapor, gas and mercury actuated thermometers and thermal systems for use between -125°F. and 100°F.

Separable wells and other accessories are also covered. The catalog is fully-illustrated with photographs, diagrams, charts and tables.

ASTM STANDARDS

The 1957 Supplements to the 1955 Book of ASTM Standards has been announced. The Supplements are available in seven parts at four dollars per part.

Part 4, available individually, covers paint, naval stores, cellulose, wax polishes, fire tests and other topics. It is a 218-page publication bound with heavy paper covers. Among the topics covered by part 4 are 33 standards

covering pigments, drying oils, paint driers and thinners, shellac and varnish, lacquer and lacquer materials, and general paint tests. It is obtainable from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

FILE FOLDER

Copies of a convenient file folder are available from Diamonite Products Manufacturing Co. Dept. PVP, 1232 Cleveland Ave., N.W., Canton 3, Ohio.

They contain information on the physical properties and characteristics of Diamonite as well as individual catalog sheets and other technical information to assist both purchasing and design engineering personnel.

COATING RESINS

A 24-page illustrated brochure lists the current line of Plaskon Coating Resins produced by Barrett Division, Allied Chemical & Dye Corp., Dept. PVP, 40 Rector St., New York 6, N. Y.

Description, performance and test data deal with oil-modified alkyd coating resins, rosin and phenolic-modified alkyds and alkyd copolymers. Detailed data is also included on urea and melamine coating resins, silicone-alkyds, modified phenolic resins, maleic resins, ester gums and pure phenolic resins.

MATERIAL HANDLING

Two new case history bulletins describing how companies solved their materials handling problems are now available free from Lewis-Shepard Products, Inc., Dept. PVP, 125 Walnut St., Watertown 72, Mass.

Each bulletin is a four-page, fully-illustrated presentation.

Bulletin 397-1 is the story of a plastics manufacturing company and its method of ending a die handling problem.

Bulletin 276-1 relates the results achieved by a printing firm in modernizing its techniques of handling paper.

PRECISION MEASUREMENT

Catalog No. 175 is now available from the Pyrometer Instrument Co., Inc., Dept. PVP, Bergenfield, N. J.

The bulletin includes descriptive and technical data on the firm's optical, micro-optical, radiation, immersion, surface and indicating pyrometers.

PROTECTIVE COATINGS

Information on controlling flow and pigment suspension properties of protective coatings is presented in Bulletin No. 32 issued by the Baker Castor Oil Co., Dept. PVP, 40 Avenue A, Bayonne, N.J.

The booklet discusses the influence of such factors as solvent and paint mill temperatures to be used in various types of coatings compositions.

Also outlined are the most effective ways of using two of the company's multi-purpose paint additives.

MANUFACTURERS' GUIDE

The Manufacturers' Agent Publishing Co., Dept. PVP, 505 Fifth Ave., New York 17, N. Y., has announced publication of the 1958 "Manufacturers' Agents' Guide."

The guide lists more than 10,000 manufacturers who distribute their products through manufacturers' agents. Also included is a comprehensive listing of manufacturers and their addresses with information as to their principle products and estimated credit rating.

The directory consists of 150-pages. The price is $10.00 and it is sold on a 10-day unconditional money-back guarantee basis.

PRODUCT SPECIFICATION

A four-page product specifications folder is now available from the Chemical Division, Delhi-Taylor Oil Corp., Dept. PVP, 415 Madison Ave., New York 17, N.Y.

Included in the folder are specification sheets on the company's nitration grade benzene and toluene, 5° xylene, high aromatic solvents and mineral spirits.

INDUSTRIAL MINIPUMP

Bulletin 1257, describing industrial miniPumps, may be obtained from the Milton Roy Co., Dept. PVP, 1300 E. Mermaid Lane, Phila. 18, Pa.

The bulletin gives complete details on specfications, design features, materials of construction and dimensions. Typical applications described include the metering of small quantities of corrosive or costly chemicals, such as perfumes and dyes.

PARTICLE SIZE ANALYZER

Bulletin No. 0708-1 titled "M-S-A Particle Size Analyzer" is now available.

This four-page illustrated booklet contains descriptions on centrifuge tubes, tube projectors and centrifuges.

Also, there is a diagrammed section devoted to the basic steps in particle analysis with the M-S-A particle size analyzer.

A list describing various useful combinations of the firm's units is also given.

Mine Safety Appliances Co., Dept. PVP, 201 N. Braddock Ave., Pittsburgh 8, Pa.

FORK TRUCK MAINTENANCE

An electric fork truck preventive maintenance chart that enforces time-and money-saving maintenance practices is now available from Lewis-Shepard Products, Inc., Dept. PVP, Watertown, Mass.

Besides offering tips on how to obtain maximum electric truck operating efficiency, the chart pinpoints 28 spacific areas that should be inspected either daily, weekly or monthly.

Use of this chart in a systematic preventive maintenance program should help to insure trouble-free operation.

THREE-ROLL MILLS

A four-page bulletin has been issued by the J. H. Day Co., Division of the Cleveland Automatic Machine Co., Dept. PVP, 4932 Beech St., Cincinnati 12, Ohio.

The bulletin, No. 158, describes the company's three-roll dispersion mills for all types of materials, including paint and lacquers.

Specifications and illustrations of four mill sizes are given.

Also, the booklet contains features on the firm's hydra-set, an advanced type of rolling setting device.

LABORATORY SPATULAS

Literature is now available from Lamson & Goodnow Mfg. Co., Dept. PVP, Shelburne Falls, Mass.

Described is the new line of laboratory spatulas with "cushion-grip" handles which have been introduced by the firm.

Literature is also available on three styles of micro-spatulas, a new laboratory scoop and scoop handle and a "hook" spatula for compounding.

NEWS

Annual Meeting

The 30th annual meeting of the Lead Industries Association will be held on April 15 and 16 at the Chase-Park Plaza Hotels, St. Louis, Mo., it has been announced by Robert L. Ziegfeld, secretary-treasurer.

Mr. Ziegfeld stated that business sessions on Tuesday afternoon and Wednesday morning, April 15 and 16, will include reports evaluating current and new uses for lead, reports of divisional activities and committees and election of directors.

As in the past, a joint meeting with the American Zinc Institute will be held on Tuesday morning, April 15, it was also announced.

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A. A. Scharwachter Passes

Albert A. Scharwachter, 61, executive vice president of Arizona Chemical Company was killed in an accident recently.

Mr. Scharwachter had been with the company for 47 yers. The firm is jointly owned by Cyanamid and and International Paper Co.

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Cleveland Club Activities

The February meeting of the Cleveland Paint & Varnish Production Club was held on February 21 at Harvey's restaurant in the Union Terminal. Vice president Fred H. Hollenberg presided.

Frederick H. Hollenberg, vice president of the Cleveland Paint & Varnish Production Club and Peyton Wheeler, assistant director of research, Minerals & Chemical Corp. of America.

LINCOLN USES LATEX PAINT: The Lincoln Division of the Ford Motor Co. has begun using water-emulsion paints in part of its body priming operations. Shown above is a '58 Lincoln nearly half-way through the 9,000 dip tank of latex primer paint. Dip is used so primer will reach all parts of unitized body. Dip tanks constitute fire hazards if filled with solvent paint.

Among those present was Peyton Wheeler, assistant director of research, Minerals & Chemicals Corporation of America. He gave a lecture on aluminum silicate pigments in protective coatings.

On February 25, Robert H. Faud, in charge of the raw materials laboratory of the Glidden Co., Cleveland, talked before students of John Marshall High School. He discussed chemistry in relation to the finishes industry and of the opportunities offered in the field to young chemists.

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Relocation in New Jersey

The new CIBA Co., Inc. headquarters establishment is now under construction in Fair Lawn, N. J., it has been announced.

The new building will replace the offices currently located in New York City.

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New England Club Meets

Present at the February meeting of the New England Club were Howard F. McCullough of the Morehouse-Cowles Co. and Frederick K. Daniel of the Daniel Products Co.

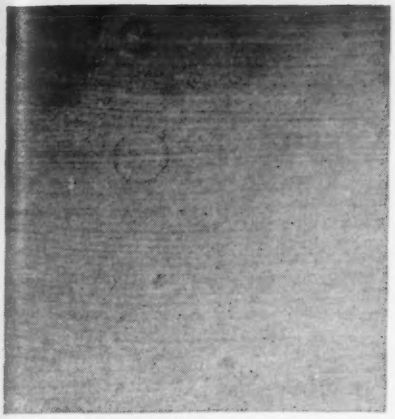
Mr. McCullough discussed the effect of pigment size and other characteristics on the proper selection of grinding and dispersing equipment. Mr. Daniel reviewed modern dispersing principles and problems created by these newer methods.

Jim Raffi, president of the club, spoke on the work of the educational committee and announced preparations for a "Practical Paint Course" at Harvard University.

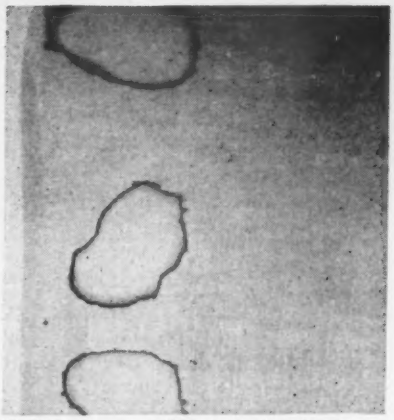
ADVERTISERS' INDEX

CYANAMID

PRODUCT NEWS

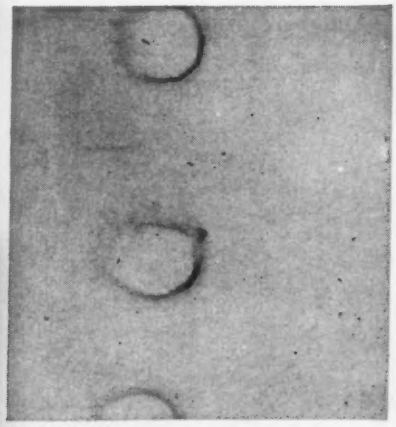


(A) CYAQUA formula #446.

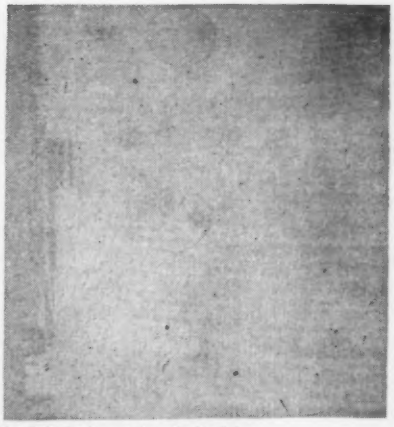


(B) Oleoresinous modified styrene-butadiene.

(C) Styrene-butadiene.



(D) Acrylic latex.



(E) Polyvinyl-acetate exterior latex.

(F) Prewar alkyd emulsion.

Test panels of commercial paints brushed on Morest charts, aged one week, water-spotted and allowed to dry.

STRIKING PROOF OF SUPERIOR WATER-SPOTTING RESISTANCE OF CYAQUA* ALKYD EMULSION INTERIOR PAINT!

The *only* finish comparable to CYAQUA emulsion flat wall paint in the test panels above is the *exterior* PVA paint!

CYAQUA emulsion paints typically develop unequaled water-spotting resistance after only 24 hours aging—a marked advantage well worth the short wait! Especially when CYAQUA emulsion paints also give you:

• even, easy brushing • easy clean-up with water • no "stage" in dry • dead flat sheen • no brush bristle softening • freedom from solvent, casein, protein • excellent adhesion • high one-coat hiding power • excellent scrub resistance (after 1 week, Fed. Spec. TT-P-29)

Behavior during manufacture and application rivals these film-forming advantages. Evaluate this amazing flat paint vehicle now—samples, technical data, formulations on request.

*Trademark

CYANAMID Plastics and Resins Division

AMERICAN CYANAMID COMPANY
PLASTICS AND RESINS DIVISION
34-P Rockefeller Plaza, New York 20, New York

In Canada: Cyanamid of Canada Limited, Toronto and Montreal

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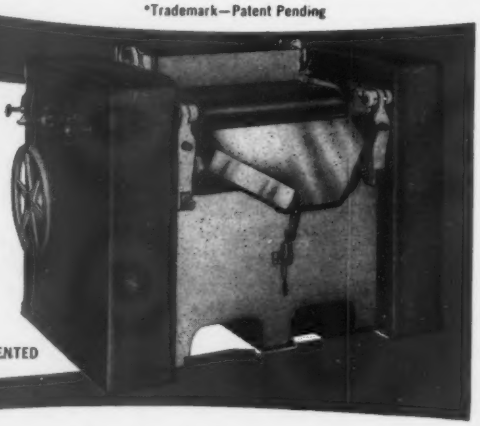
TROY

DUPLEX DISPERSER*

Produces Finished Product in One Operation

Compact unit combines powerful disperser head with rugged diamond-shaped agitator to produce finished batches *without further milling* for the majority of inks and paints. Modern design gives proportional hydraulic shear, kinetic impingement and mulling action for better wetting, improved color dispersion, and uniform blending.
Send samples for trial processing.

*Trademark—Patent Pending



ROLLER MILL

With *One Point* Adjustment "Floating Roll" Principle

For high speed precision-controlled dispersion and grinding of ink, paint, coatings, and similar products. Floating Roll principle minimizes roll deflection, gives maximum grinding surface. Exclusive one-point adjustment speeds clean-up time and provides quick, accurate resetting of rolls.

PATENTED

COLLOID MILL With Triple Action Design

Utilizes three zones of action — at upper face of rotor, between peripheral surface of rotor and housing, and between under face of rotor and housing — for better emulsions and finer dispersions. Unit design prevents aeration of materials. Clearances adjustable while unit is in operation by calibrated adjusting ring.

Write TODAY FOR NEW 1958 Troy Processing Equipment Catalog and the name of your nearest dealer.

TROY

Send Sample of Your Material for Trial Processing. No Obligation.